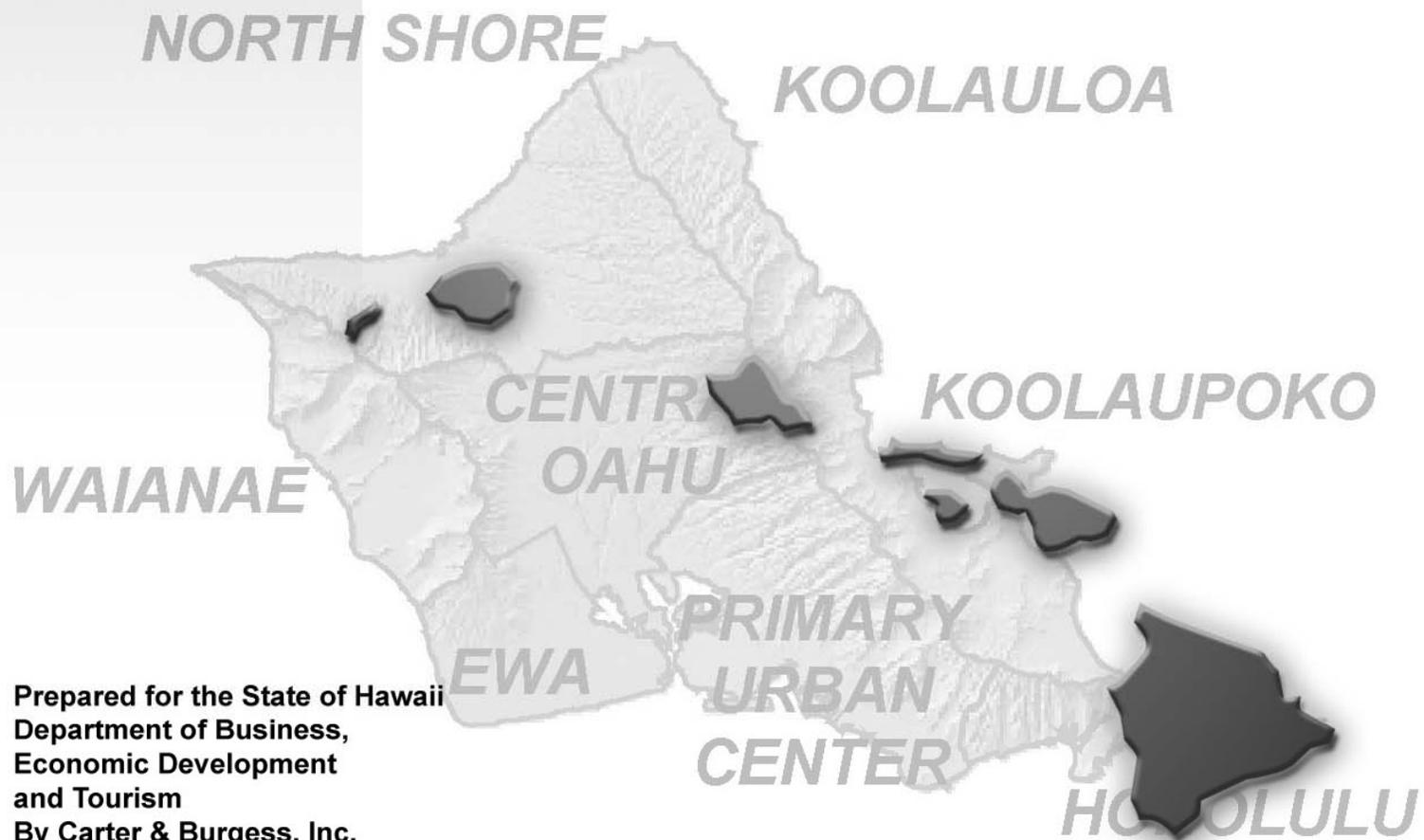


# Planning for Sustainable Tourism in Hawaii

## Part 1: INFRASTRUCTURE & ENVIRONMENTAL OVERVIEW STUDY

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VOLUME II: CITY AND COUNTY  
OF HONOLULU



Prepared for the State of Hawaii  
Department of Business,  
Economic Development  
and Tourism  
By Carter & Burgess, Inc.

December, 2002

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|   |     |
|---|-----|
| Introduction to City and County of Honolulu.....  | 6   |
| Recommendations for City and County of Honolulu .....   | 10  |
| City and County of Honolulu – Water Quality and Quantity .....                                    | 15  |
| City and County of Honolulu – Sewage .....  | 18  |
| City and County of Honolulu – Solid Waste Disposal.....   | 21  |
| City and County of Honolulu – Storm Water .....   | 24  |
| City and County of Honolulu – Roads.....  | 27  |
| City and County of Honolulu – Airports .....  | 32  |
| City and County of Honolulu – Harbors.....  | 36  |
| City and County of Honolulu – Parks .....   | 38  |
| City and County of Honolulu – Police, Fire and Emergency Services.....                            | 44  |
| City and County of Honolulu – Visitor Accommodations .....  | 49  |
| City and County of Honolulu – Private Transportation .....  | 53  |
| City and County of Honolulu – Energy Systems .....  | 55  |
| City and County of Honolulu – Sewer Systems .....   | 59  |
| City and County of Honolulu – Coastal Water Quality.....  | 60  |
| City and County of Honolulu – Marine Ecosystem Health.....  | 63  |
| City and County of Honolulu – Forestry / Green Space .....  | 64  |
| City and County of Honolulu – Air Quality.....  | 68  |
| City and County of Honolulu – Beach Erosion .....   | 72  |
| City and County of Honolulu – Invasive Species .....  | 75  |
| City and County of Honolulu – Other Natural / Scenic Resources - Native<br>Extinction .....       | 77  |
| City and County of Honolulu – Primary Urban Center – Water Quality and<br>Quantity .....          | 79  |
| City and County of Honolulu – Primary Urban Center – Sewage.....                                  | 81  |
| City and County of Honolulu – Primary Urban Center – Solid Waste Disposal...                      | 83  |
| City and County of Honolulu – Primary Urban Center – Storm Water.....                             | 84  |
| City and County of Honolulu – Primary Urban Center – Roads .....                                  | 86  |
| City and County of Honolulu – Primary Urban Center – Airports .....                               | 88  |
| City and County of Honolulu – Primary Urban Center – Harbors.....                                 | 89  |
| City and County of Honolulu – Primary Urban Center – Parks .....                                  | 93  |
| City and County of Honolulu – Primary Urban Center – Police, Fire and<br>Emergency Services ..... | 96  |
| City and County of Honolulu – Primary Urban Center – Visitor Accommodations<br>.....              | 98  |
| City and County of Honolulu – Primary Urban Center – Visitor Related Area ...                     | 101 |
| City and County of Honolulu – Primary Urban Center – Visitor Related Area 2                       | 104 |
| City and County of Honolulu – Primary Urban Center – Private Transportation                       | 110 |
| City and County of Honolulu – Primary Urban Center – Energy Systems.....                          | 111 |
| City and County of Honolulu – Primary Urban Center – Sewer Systems.....                           | 112 |
| City and County of Honolulu – Primary Urban Center – Coastal Water Quality                        | 113 |
| City and County of Honolulu – Primary Urban Center – Marine Ecosystem Health<br>.....             | 114 |
| City and County of Honolulu – Primary Urban Center – Forestry / Green Space<br>.....              | 115 |

---

|   |     |
|---|-----|
| City and County of Honolulu – Primary Urban Center – Air Quality .....                      | 116 |
| City and County of Honolulu – Primary Urban Center – Beach Erosion .....                    | 117 |
| City and County of Honolulu – Primary Urban Center – Invasive Species .....                 | 118 |
| City and County of Honolulu – Primary Urban Center – Other Natural / Scenic Resources ..... | 119 |
| City and County of Honolulu – Central Oahu – Water Quality and Quantity .....               | 120 |
| City and County of Honolulu – Central Oahu – Sewage .....                                   | 122 |
| City and County of Honolulu – Central Oahu – Solid Waste Disposal .....                     | 124 |
| City and County of Honolulu – Central Oahu – Storm Water .....                              | 126 |
| City and County of Honolulu – Central Oahu – Roads .....                                    | 128 |
| City and County of Honolulu – Central Oahu – Airports .....                                 | 130 |
| City and County of Honolulu – Central Oahu – Harbors .....                                  | 131 |
| City and County of Honolulu – Central Oahu – Parks .....                                    | 132 |
| City and County of Honolulu – Central Oahu – Police, Fire and Emergency Services .....      | 135 |
| City and County of Honolulu – Central Oahu – Visitor Accommodations .....                   | 137 |
| City and County of Honolulu – Central Oahu – Private Transportation .....                   | 138 |
| City and County of Honolulu – Central Oahu – Energy Systems .....                           | 139 |
| City and County of Honolulu – Central Oahu – Sewer Systems .....                            | 140 |
| City and County of Honolulu – Central Oahu – Coastal Water Quality .....                    | 141 |
| City and County of Honolulu – Central Oahu – Marine Ecosystem Health .....                  | 142 |
| City and County of Honolulu – Central Oahu – Forestry / Green Space .....                   | 143 |
| City and County of Honolulu – Central Oahu – Air Quality .....                              | 144 |
| City and County of Honolulu – Central Oahu – Beach Erosion .....                            | 145 |
| City and County of Honolulu – Central Oahu – Invasive Species .....                         | 146 |
| City and County of Honolulu – Central Oahu – Other Natural / Scenic Resources .....         | 147 |
| City and County of Honolulu – Ewa – Water Quality and Quantity .....                        | 148 |
| City and County of Honolulu – Ewa – Sewage .....  | 150 |
| City and County of Honolulu – Ewa – Solid Waste Disposal .....                              | 152 |
| City and County of Honolulu – Ewa – Storm Water .....                                       | 154 |
| City and County of Honolulu – Ewa – Roads .....   | 156 |
| City and County of Honolulu – Ewa – Airports .....  | 159 |
| City and County of Honolulu – Ewa – Harbors .....   | 161 |
| City and County of Honolulu – Ewa – Parks .....   | 163 |
| City and County of Honolulu – Ewa – Police, Fire and Emergency Services .....               | 166 |
| City and County of Honolulu – Ewa – Visitor Accommodations .....                            | 168 |
| City and County of Honolulu – Ewa – Private Transportation .....                            | 169 |
| City and County of Honolulu – Ewa – Energy Systems .....                                    | 170 |
| City and County of Honolulu – Ewa – Sewer Systems .....                                     | 171 |
| City and County of Honolulu – Ewa – Coastal Water Quality .....                             | 172 |
| City and County of Honolulu – Ewa – Marine Ecosystem Health .....                           | 173 |
| City and County of Honolulu – Ewa – Forestry / Green Space .....                            | 174 |
| City and County of Honolulu – Ewa – Air Quality .....                                       | 175 |
| City and County of Honolulu – Ewa – Beach Erosion .....                                     | 176 |
| City and County of Honolulu – Ewa – Invasive Species .....                                  | 177 |

---

|  |     |
|--|-----|
| City and County of Honolulu – Ewa – Other Natural / Scenic Resources .....               | 178 |
| City and County of Honolulu – Waianae – Water Quality and Quantity .....                 | 179 |
| City and County of Honolulu – Waianae – Sewage .....                                     | 180 |
| City and County of Honolulu – Waianae – Solid Waste Disposal .....                       | 182 |
| City and County of Honolulu – Waianae – Storm Water .....                                | 183 |
| City and County of Honolulu – Waianae – Roads .....                                      | 184 |
| City and County of Honolulu – Waianae – Airports .....                                   | 185 |
| City and County of Honolulu – Waianae – Harbors.....                                     | 186 |
| City and County of Honolulu – Waianae – Parks .....                                      | 187 |
| City and County of Honolulu – Waianae – Police, Fire and Emergency Services<br>.....     | 188 |
| City and County of Honolulu – Waianae – Visitor Accommodations .....                     | 190 |
| City and County of Honolulu – Waianae – Private Transportation .....                     | 191 |
| City and County of Honolulu – Waianae – Energy Systems .....                             | 192 |
| City and County of Honolulu – Waianae – Sewer Systems .....                              | 193 |
| City and County of Honolulu – Waianae – Coastal Water Quality .....                      | 194 |
| City and County of Honolulu – Waianae – Marine Ecosystem Health.....                     | 195 |
| City and County of Honolulu – Waianae – Forestry / Green Space .....                     | 196 |
| City and County of Honolulu – Waianae – Air Quality.....                                 | 197 |
| City and County of Honolulu – Waianae – Beach Erosion .....                              | 198 |
| City and County of Honolulu – Waianae – Invasive Species .....                           | 199 |
| City and County of Honolulu – Waianae – Other Natural / Scenic Resources ..              | 200 |
| City and County of Honolulu – North Shore – Water Quality and Quantity .....             | 201 |
| City and County of Honolulu – North Shore – Sewage .....                                 | 203 |
| City and County of Honolulu – North Shore – Solid Waste Disposal .....                   | 204 |
| City and County of Honolulu – North Shore – Storm Water .....                            | 205 |
| City and County of Honolulu – North Shore – Roads.....                                   | 206 |
| City and County of Honolulu – North Shore – Airports.....                                | 208 |
| City and County of Honolulu – North Shore – Harbors .....                                | 209 |
| City and County of Honolulu – North Shore – Parks .....                                  | 210 |
| City and County of Honolulu – North Shore – Police, Fire and Emergency<br>Services ..... | 212 |
| City and County of Honolulu – North Shore – Visitor Accommodations .....                 | 215 |
| City and County of Honolulu – North Shore – Private Transportation .....                 | 217 |
| City and County of Honolulu – North Shore – Energy Systems .....                         | 218 |
| City and County of Honolulu – North Shore – Sewer Systems .....                          | 219 |
| City and County of Honolulu – North Shore – Coastal Water Quality .....                  | 220 |
| City and County of Honolulu – North Shore – Marine Ecosystem Health .....                | 221 |
| City and County of Honolulu – North Shore – Forestry / Green Space .....                 | 222 |
| City and County of Honolulu – North Shore – Air Quality.....                             | 223 |
| City and County of Honolulu – North Shore – Beach Erosion .....                          | 224 |
| City and County of Honolulu – North Shore – Invasive Species .....                       | 225 |
| City and County of Honolulu – North Shore – Other Natural / Scenic Resources<br>.....    | 226 |
| City and County of Honolulu – Koolau Loa – Water Quality and Quantity .....              | 227 |
| City and County of Honolulu – Koolau Loa – Sewage .....                                  | 228 |

---

|  |     |
|--|-----|
| City and County of Honolulu – Koolau Loa – Solid Waste Disposal .....                    | 230 |
| City and County of Honolulu – Koolau Loa – Storm Water .....                             | 231 |
| City and County of Honolulu – Koolau Loa – Roads .....                                   | 233 |
| City and County of Honolulu – Koolau Loa – Airports .....                                | 234 |
| City and County of Honolulu – Koolau Loa – Harbors.....                                  | 235 |
| City and County of Honolulu – Koolau Loa – Parks .....                                   | 236 |
| City and County of Honolulu – Koolau Loa – Police, Fire and Emergency<br>Services .....  | 238 |
| City and County of Honolulu – Koolau Loa – Visitor Accommodations .....                  | 240 |
| City and County of Honolulu – Koolau Loa – Private Transportation .....                  | 241 |
| City and County of Honolulu – Koolau Loa – Energy Systems .....                          | 242 |
| City and County of Honolulu – Koolau Loa – Sewer Systems .....                           | 243 |
| City and County of Honolulu – Koolau Loa – Coastal Water Quality .....                   | 244 |
| City and County of Honolulu – Koolau Loa – Marine Ecosystem Health.....                  | 245 |
| City and County of Honolulu – Koolau Loa – Forestry / Green Space .....                  | 246 |
| City and County of Honolulu – Koolau Loa – Air Quality .....                             | 247 |
| City and County of Honolulu – Koolau Loa – Beach Erosion .....                           | 248 |
| City and County of Honolulu – Koolau Loa – Invasive Species .....                        | 249 |
| City and County of Honolulu – Koolau Loa – Other Natural / Scenic Resources<br>.....     | 250 |
| City and County of Honolulu – Koolau Poko – Water Quality and Quantity .....             | 251 |
| City and County of Honolulu – Koolau Poko – Sewage .....                                 | 252 |
| City and County of Honolulu – Koolau Poko – Solid Waste Disposal .....                   | 254 |
| City and County of Honolulu – Koolau Poko – Storm Water .....                            | 255 |
| City and County of Honolulu – Koolau Poko – Roads.....                                   | 257 |
| City and County of Honolulu – Koolau Poko – Airports.....                                | 258 |
| City and County of Honolulu – Koolau Poko – Harbors .....                                | 259 |
| City and County of Honolulu – Koolau Poko – Parks.....                                   | 260 |
| City and County of Honolulu – Koolau Poko – Police, Fire and Emergency<br>Services ..... | 262 |
| City and County of Honolulu – Koolau Poko – Visitor Accommodations.....                  | 264 |
| City and County of Honolulu – Koolau Poko – Private Transportation .....                 | 265 |
| City and County of Honolulu – Koolau Poko – Energy Systems .....                         | 266 |
| City and County of Honolulu – Koolau Poko – Sewer Systems .....                          | 267 |
| City and County of Honolulu – Koolau Poko – Coastal Water Quality .....                  | 268 |
| City and County of Honolulu – Koolau Poko – Marine Ecosystem Health .....                | 275 |
| City and County of Honolulu – Koolau Poko – Forestry / Green Space .....                 | 276 |
| City and County of Honolulu – Koolau Poko – Air Quality.....                             | 277 |
| City and County of Honolulu – Koolau Poko – Beach Erosion .....                          | 278 |
| City and County of Honolulu – Koolau Poko – Invasive Species .....                       | 279 |
| City and County of Honolulu – Koolau Poko – Other Natural / Scenic Resources<br>.....    | 280 |
| City and County of Honolulu – East Honolulu – Water Quality and Quantity ....            | 281 |
| City and County of Honolulu – East Honolulu – Sewage .....                               | 283 |
| City and County of Honolulu – East Honolulu – Solid Waste Disposal .....                 | 286 |
| City and County of Honolulu – East Honolulu – Storm Water .....                          | 288 |

---

|  |     |
|--|-----|
| City and County of Honolulu – East Honolulu – Roads.....                                   | 290 |
| City and County of Honolulu – East Honolulu – Airports.....                                | 292 |
| City and County of Honolulu – East Honolulu – Harbors .....                                | 293 |
| City and County of Honolulu – East Honolulu – Parks.....                                   | 295 |
| City and County of Honolulu – East Honolulu – Police, Fire and Emergency<br>Services ..... | 298 |
| City and County of Honolulu – East Honolulu – Visitor Accommodations.....                  | 300 |
| City and County of Honolulu – East Honolulu – Private Transportation.....                  | 301 |
| City and County of Honolulu – East Honolulu – Energy Systems .....                         | 302 |
| City and County of Honolulu – East Honolulu – Sewer Systems .....                          | 303 |
| City and County of Honolulu – East Honolulu – Coastal Water Quality .....                  | 304 |
| City and County of Honolulu – East Honolulu – Marine Ecosystem Health .....                | 305 |
| City and County of Honolulu – East Honolulu – Forestry / Green Space .....                 | 306 |
| City and County of Honolulu – East Honolulu – Air Quality.....                             | 307 |
| City and County of Honolulu – East Honolulu – Beach Erosion.....                           | 308 |
| City and County of Honolulu – East Honolulu – Invasive Species .....                       | 309 |
| City and County of Honolulu – East Honolulu – Other Natural / Scenic Resources<br>.....    | 310 |
| Reference List.....  | 311 |
| Contacts List.....   | 324 |
| Appendix.....  | 327 |

## Introduction to City and County of Honolulu

City and County of Honolulu is comprised of the island of Oahu and all islands and water within three miles of the Oahu coastline and Northwestern Hawaiian Islands- from Nihoa to Kure Atoll (except Midway Islands). The City and County is divided into 8 communities. Two community plans, the Primary Urban Center and Ewa, are considered development plans. These two areas are destined for the majority of growth occurring on Oahu. The remaining six communities – Central Oahu, East Honolulu, Koolau Poko, Koolau Loa, North Shore and Waianae – are deemed sustainable communities. The differences between the two types are that the sustainable communities' focus is on maintaining and sustaining their unique character and lifestyle. This includes preservation of agricultural and conservation lands which are of economic and environmental value.<sup>92, 2002</sup> (See the general map of Oahu in the Appendix.)

The General Plan for the City and County of Honolulu, and each of the community plans, are based on eleven principles: population, economic activity, natural environment, housing, transportation and utilities, energy, physical development and urban design, public safety, health and education, culture and recreation and government operations and fiscal management. It was with these principles in mind that the General Plan was developed. The General Plan was developed with significant input from residents within each community.

The major **assumption** in the General Plans is that they are based on the Department of Business, Economic Development and Tourism population projections. Any revision of the population projections means reevaluation of the General Plans. The following table is a projection of the resident population distribution for the year 2010.

**Table 2.01: Distribution of Residential Population**

| <b>County and district</b> | <b>2000</b> |
|----------------------------|-------------|
| State total                | 1,211,537   |
| City & Co. of Honolulu     | 876,156     |
| Honolulu                   | 372,279     |
| Koolaupoko                 | 117,994     |
| Koolauloa                  | 18,899      |
| Waialua                    | 14,027      |
| Wahiawa                    | 38,370      |
| Waianae                    | 42,259      |
| Ewa                        | 272,328     |

Source: *2001 State Of Hawaii Data Book*

The average visitor census for Oahu is 79,699. Domestic arrivals account for 50,315 visitors, while international accounts for 29,385 visitors, according to the *2001 State of Hawaii Data Book*.

Other goals for the General Plan include:

- Maintaining the viability of the visitor industry, agricultural industry and oceanic resources;
- Controlling growth and distribution of visitor and resident populations; and
- Maintaining Oahu as a desirable place to live.

The remainder of this introduction is dedicated to a brief description of each of the planning areas.

### ***Central Oahu***

Central Oahu Sustainable Community Plan Area is expected to experience moderate growth as areas zoned residential are built out. The population will grow from almost 149,000 people in 2000 to over 173,000 in 2025. Significant job growth is also expected, rising from almost 39,000 jobs in 2000 to over 65,000 in 2025. The bulk of the private non-construction job growth is projected to be in services, retail, or transportation/communications/utilities (70%) with another 20% in industrial occupations. There are few visitor accommodations available in this area; however, there are some attractions.

### ***East Honolulu***

East Honolulu is expected to have very little growth over the next 20-25 years. Maintenance of current patterns of development characteristics are expected to prevail. Goals for the area include:

- Preservation of open spaces;
- Preservation of natural, cultural, scenic and historic resources; and
- Replacement of aging infrastructure.

While there are visitor attractions in the area, there are few visitor accommodations. Vacation rentals and bed and breakfast (B&B) units are difficult to track.

### ***Ewa***

Ewa is the second development planning area. It is considered the second civic center for City and State offices, the second economic center for industry and resorts, and the University of Hawaii is planning a West Oahu campus. It is designed to relieve the pressure from building on the urban fringe of the Primary Urban Center. The population here is expected to go from 43,000 in 1990 to 125,000 in 2025. Jobs likewise are expected to increase from 17,000 in 1990 to 64,000 in 2025.

Development in Ewa includes the existing Ko Olina Resort and Ewa Marina to be the beginning of what will be the second resort area on Oahu. Barber's Point is to be developed into Kalaeloa Regional Park and Recreation Complex. Since the demise of Barber's Point Naval Air Station, the area is to be revitalized and redeveloped.

### ***Koolau Loa***

The plan for this community is to keep population low through limited growth, yet encourage a small commercial and agricultural economically sustainable base. Ideas include linking agricultural crops to the cultural tourism industry as interest transpires. Management of the community is to be based on the ahupuaa concept for organizational and political boundaries.

Koolau Loa is a rural area plentifully endowed with natural and scenic resources. It is a sustainable community with an agricultural and commercial economic base. Maintenance of the rural country setting is desirable to residents and visitors. Efforts to preserve these resources are underway. Other issues for the community include:

- Increasing employment opportunities in the area;
- Encouragement of low-impact businesses; and
- Maintenance and improvements to various infrastructure (road safety, sewage, water, storm water drainage and parks).

There are minimal visitor accommodations and one major attraction in this area. Plans are to renew and expand facilities at the Polynesian Cultural Center and maintain existing plans for development of resort at Kuilima. These plans will help maintain a good job source and small economy based on visitor industry.

### ***Koolau Poko***

In keeping with the purpose of the Koolau Poko General Plan, the area is expected to experience essentially no growth (0.005% increase) over the next 20 years. Policies supporting this goal focus on maintaining current patterns of development on the Primary Urban Center and Ewa fringes and in rural areas. Other areas of focus are protection of the communities' natural and cultural resources, and the improvement or replacement of aging infrastructure.

Infrastructure concerns for this area include:

- Alternatives to private passenger vehicles;
- Enhance existing commercial establishments; and
- Establish urban, rural, agricultural and preservation boundaries.

### ***North Shore***

The role of the North Shore is to maintain the rural character, agricultural, cultural and natural resources and scenic beauty. Plans are to limit growth to infill areas within or adjacent to built areas. New growth is to accommodate housing and employment needs and will be limited to Haleiwa and Wailalua, which are the

primary country towns in this area. Land use and natural resource management is based on the ahupuaa concept.

One goal for this area is to define infrastructure improvements. A main consideration of this is to consider visitor impacts in determining allocation of resources and facilities.

### ***Primary Urban Center***

The Primary Urban Center (PUC) accounts for approximately 50% of island's population. This area is anticipated to receive moderate growth at the urban fringe and to maintain a compact city center through infilling. A mix of different zoning has resulted in neighborhood, business and industry existing side by side.

A goal of the PUC is to maintain its holding as the Pacific region's leading city and travel destination. Waikiki is the primary visitor destination not just for Oahu, but also for Hawaii. Numerous natural, cultural and historic resources attract visitors year round.

### ***Waianae***

While little growth is desired in Waianae, it will be difficult to prevent it. Given the tremendous growth from the 1950s into the 1990s, Waianae is the most developed of Oahu's rural communities. Waianae also has the strongest community involvement going into their community plan. Their main goal is well-defined infrastructure needs, especially replacement and improvement of aging infrastructure.

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## **Recommendations for City and County of Honolulu**

### ***Public Infrastructure***

#### ***Terrestrial Water Supply Quality and Quantity***

Water quantities are approaching the sustainable yield for most communities. North Shore and the Koolau area are the exception; permitted use has not yet reached the sustainable yield. Water reclamation and alternative sources of potable water are needed. Water reclamation can satisfy non-potable water needs such as agricultural and industrial uses. Desalinization or other sources of potable water need to be identified and developed.

Continued monitoring of water quality is also needed. Agricultural chemicals, utilized over long periods, are present in some water sources. Water quality at the watershed should also be monitored. Oahu's forests and issues regarding native and invasive species are interrelated and can become problematic. Invasive species replace native species within the watershed to the detriment of water quality. (An example is Miconia in Tahiti. Miconia crowds out native species from the watershed. The shallow root system promotes landslides that release sediment and cloud water quality issues.)

#### ***Sewage***

There are a few recommendations regarding sewage on Oahu. Issues with available water can be solved through refining treatment of sewage. This allows effluent to be used for agricultural and industrial needs. Another issue is sewage leakage / salt-water intrusion, aging equipment and facilities and the use of cesspools. Aging sewage equipment, lines and facilities can no longer prevent sewage leaks and salt-water intrusion. These need to be repaired and or upgraded to the appropriate capacity. Another upgrade is for homeowners with cesspools to connect to municipal sewer systems. Cesspools, depending upon the circumstances, can be public health hazard. Low-income homeowners may need financial assistance to be able to connect to the municipal system. Funding should be made available for them. Finally, homeowners in areas around sewage treatment plants would appreciate any dampening of odor problems and appropriate landscaping.

#### ***Solid Waste Disposal***

Reduction in packaging of consumer goods, reuse of non-recyclable materials and recycling can greatly reduce the amount of solid waste headed for landfills. Government encouragement of public recycling and recycling businesses should be promoted. These measures would lower the per-capita waste generation and stimulate the recycling business and increase the lifespan of landfills.

Another aspect of reducing solid waste is waste-to-energy or H-POWER. H-POWER converts solid waste into ash with the added benefit of needed energy generation as a byproduct. This should be encouraged.

### ***Storm Water***

Non-point source pollution is one of Oahu's greatest environmental concerns. Monitoring of storm water is needed along with enforcement of health code violations. Public awareness can reduce non-point source pollution. Any decrease in non-point source pollution means cleaner beaches, and fewer beach closures, especially after storms. Another method to reducing polluted beaches is through the use of retention ponds and wetlands that allow for settling and filtration of runoff. Storm water runoff is a source of aquifer replenishment when the water is given time to percolate through the soil and into the ground water.

### ***Roads***

No significant changes are scheduled to improve peak traffic congestion. There are several areas throughout Oahu that are currently bottlenecks (H1-H2 merge, Middle Street Merge, etc.) and the level of service is D-F grade. When gridlock occurs and the public demands improvements changes may occur. There is an immediate need for coordination between state and city transportation departments. Some minor recommendations may alleviate peak traffic congestions such as traffic light coordination, staggered work shifts, or enhanced bus schedules (more buses, express routes, etc.), alternative transportation methods, and enforcement of HOV violations. The limited land resources make expansion of most roads economically and logistically difficult.

### ***Airports***

The Honolulu International Airport was constructed based on optimistic projections of demand from the 1970-80's. A slower than projected growth in tourism as well as acceptance of international and mainland flights to outer islands leaves HIA with capacity. The effects of 9-11 have caused increased security that has changed flight travel expectations creating long lines at security and decreased sales for retail spaces. There is a need to maximize lease space and organize the facilities to efficiently move people by upgrading and expanding cargo facilities and reducing curbside traffic congestion.

### ***Harbors***

Honolulu Harbor is at capacity with strong competition for the limited number of berths and multiple uses for existing berths. Barbers Point Harbor should be improved to handle additional cargo ship arrivals and boat repair and maintenance facilities. Improvements should be made to the cruise ship arrival area and "tour boat" area. Proposals for re-opening of Keehi Channel should be coordinated with operations at Honolulu International Airport. Improvements in

cargo terminals and on site storage are needed at Honolulu Harbor. Harbor administrative operations should be consolidated to one location.

### ***Parks***

Crowding is generally due to inadequate or undeveloped park acreage, facilities and amenities. Further study and detailed plans for each district are needed to identify resource areas with recreational value and to develop these areas by their assets and/or public needs assessment. In the highly urbanized areas other sources of open space development are needed as acquisition of additional green space is economically infeasible. In high growth areas park dedication requirements should be enforced to ensure developers build neighborhood parks. Limited availability of coastline requires park lands be developed in mauka locations.

Normal funding sources, strained as they are, are stretched to their limits to maintain current infrastructure. Additional sources of funding for new facilities, renovations and staffing need to be identified to expand and/or improve Honolulu County parks. Some possibilities of funding are private operation/maintenance or concession stands. There may be sources of sector specific funds or partnerships with resort management or developers.

### ***Police, Fire and Emergency Services***

The economic crunch experienced by both the State of Hawaii and County of Hawaii are impacting all infrastructure elements. Current funding falls short of providing the police services expected by the public. While service calls have increased, funding has not kept pace. Research into monies available through Homeland Security and other sources needs to be done.

Unfortunately, the number of service calls for both the Police Department and Fire Department exceeds the manpower needed to respond in a timely manner. Response to major traffic incidents is slow and causes traffic congestion. New threats in national security have increased the need for special personnel and equipment to respond to terrorism threats and HAZMAT.

Further study, long-range planning, cost projections and study of demographics within each district is vital to efficiently and strategically place manpower and emergency response equipment and facilities.

Increasing visitor awareness of various local hazards (heat stroke, getting lost on trails, ocean hazards) may reduce the number of tourist related incidents.

### ***Private Infrastructure***

#### ***Visitor Accommodation***

Visitor accommodations are privately owned and operated and development is in response to industry demand. Since Waikiki is consider built-out, expansion is

being encouraged in downtown Honolulu and Kapolei areas. Generally development has been slow outside of Waikiki. Within Waikiki emphasis is on renovation of existing inventory.

### ***Private Transportation***

Information on Private Transportation is difficult to get from privately held companies. This sector is heavily utilized by the visitor population and the assumption is that it will expand as demand requires. Information was limited to tax and licensing numbers.

### ***Energy Systems***

Growth is projected for Honolulu, Ewa, and Central Oahu and will create an increased demand for power. Additional power generation sources will be necessary in the future however as development continues to cover Oahu there will be difficulty in citing power generation facilities away from urban areas. Emphasis should be placed on demand side energy conservation programs as well as developing alternative sources of energy.

### ***Sewer Systems***

The Sewer Systems indicator was combined with Sewage. There is a need to connect those household still having cesspools with county facilities.

### ***Environmental Features***

#### ***Coastal Water Quality***

The coastal water quality around Oahu is generally good. The major threat to the water quality is from non-point source pollution such as urban and agricultural run off. The waters off of Waikiki are exceptionally clean considering the highly urbanized land environment. The Ala Wai Canal is created with absorbing and filtering the majority of the areas non-point source pollution. Containment or treatment of storm water runoff should be used to ensure the high quality of Oahu's coastal waters.

#### ***Marine Ecosystem Health***

The Marine Ecosystem Health indicator was combined with Coastal Water Quality.

#### ***Forestry / Green Space***

Urban green space areas should be enhanced through planting of trees and landscaping. Mauka areas of forestry should be maintained for their significant watershed and recreational contributions. In urbanized areas where green space is not easily expanded there is an emphasis on open space such as plazas where alternative open air experiences can occur.

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### ***Air Quality***

Though Oahu enjoys excellent air quality. Most air quality concerns occur in times of Kona weather and are caused by volcanic activity. Encouragement of alternative forms of transportation can contribute to a reduction in emissions and improvement in air quality in urbanized areas.

### ***Beach Erosion***

Beach erosion is a natural phenomena that is accelerated by human impacts. The Island of Oahu has the highest rate of beach erosion in the state. More research on beach erosion and better management practices to control the process are needed. Reduction of shoreline hardening through increases in building setbacks and removal of illegal structures are recommended. The use alternative methods of structure and dune protection such as beach replenishment should be considered before shoreline hardening occurs.

### ***Invasive Species***

Increased public and visitor awareness of the damaging effects of invasive species is considered the most effective means of controlling invasive species. Enforcement of quarantines and more thorough inspections of materials entering from areas known to have invasive species is necessary. The eradication programs and monies of government and various special interest groups should be coordinated to reduce the duplication of efforts.

### ***Other Appropriate Natural and Scenic Resources***

Oahu has many natural and scenic resources that must be protected.

#### Riparian / Wetlands

Non-point source pollution is biggest environmental threat to island wetlands. Invasive species are more prominent in coastal areas (wetlands) than at higher elevations; thus decreasing the effect of wetlands as an ecological water filter.

#### Native Species / Extinction Issues

Native species are threatened by habitat destruction and through competition for food from invasive species. Emphasis should be on protection of ecosystems as a whole instead of particular individuals or species. Increased funding is need for research and sampling/propagation of threatened species. Encourage the use of native plant species that are adjusted to Hawaii's climate as compared to water thirsty plants and invasive species. Amnesty bins programs should be expanded.

## City and County of Honolulu – Water Quality and Quantity

### ***Present Capacity and Usage***

*Water Resources on Oahu* describes that approximately 92 percent of Oahu’s water comes from underground aquifers fed by rainfall along the Koolau and Waianae mountain ranges. The remainder of the island’s water supply is provided by high-level dike tunnels (such as the Waihee and Luluku). (See the table of water sources and supply, and sustainable yields per aquifer for Oahu in the Appendix.)

The island of Oahu has an extensive infrastructure list, which is outlined in the *Water Resources on Oahu*:

- The Halawa Underground Pumping Station, also known as Halawa Shaft, provides approximately 10% of the total water for the Honolulu area;
- There are 77 well stations, with 180 potable water wells; and
- 18 tunnels (Honolulu, Windward & Waianae areas).

**Table 2.02: Reservoir Capacities for the Island of Oahu**

| <b>District</b>         | <b>Number of Reservoirs</b> | <b>Capacity</b> |
|-------------------------|-----------------------------|-----------------|
| Honolulu District       | 66 reservoirs               | 52.07 mg        |
| Windward District       | 20 reservoirs               | 26.30 mg        |
| Waialua-Kahuku District | 8 reservoirs                | 6.80 mg         |
| Wahiawa District        | 7 reservoirs                | 8.00 mg         |
| Waianae District        | 11 reservoirs               | 8.06 mg         |
| Ewa District            | 11 reservoirs               | 27.50 mg        |
| Pearl Harbor District   | 40 reservoirs               | 40.80 mg        |

Source: *Water Resources on Oahu*

The Board of Water Supply’s (BWS) field operations crews maintain an extensive network of transmission mains and pipelines that connect virtually all of the island’s water systems. According to the *Water Resources of Oahu*, 2001 Oahu currently maintains:

- 1,842 miles of pipeline (9,725,760 lineal feet) with a size range of ¾” to 42” in diameter; and
- 17,513 fire hydrants. <sup>44, 2001</sup>

The *East Honolulu Sustainable Communities Plan* describes water regulations and supply on the Island of Oahu. The Oahu Water Management Plan (OWMP), signed into law in 1990, is the City and County of Honolulu’s component of the Hawaii Water Plan. The OWMP sets forth strategies to guide the State Commission on Water Resource Management (CWRM) in planning and managing Oahu’s water resources. Based on CWRM’s 1996 basal permitted uses on Oahu for about 340 million gallons per day (MGD), there is

approximately 75 MGD of untapped sustainable yield remaining in the islandwide groundwater supply to be developed.<sup>93, 2001</sup>

The *Report to the World Health Organization* states that the BWS has granular activated carbon (GAC) treatment plants at 11 well stations in the Waialua, Mililani, Kunia and Waipahu areas, treating over 45 MGD of average day capacity.<sup>154, 2000</sup>

See the Appendix for the City and County of Honolulu Oahu Board of Water Supply graphic of groundwater consumption.

### ***Existing Problems, Issues and Opportunities***

The following challenges to meet the quickly approaching sustainable yield are outlined in the *General Plan: City and County of Honolulu*:

- Develop and maintain an adequate supply of water for residents and visitors, agricultural and industrial needs;
- Encourage the development of new technology, which will reduce the cost of providing water and the cost of waste disposal; and
- Encourage a lowering of the per-capita consumption of water and the per-capita production of waste.<sup>28, 1992</sup>

The *Report to the World Health Organization* notes that chemicals found in some of Oahu's Pearl Harbor wells are attributed to decades of pesticide and herbicide application from large-scale agriculture, such as pineapple and sugarcane. Dieldrin and chlordane attributed to ground termite treatment, have also been detected in some Honolulu wells.

The BWS has constructed or is in the process of constructing numerous water treatment systems at each of the wells stations where chemical contamination has been detected. For volatile organic compounds such as pesticides and herbicides, granular activated carbon (GAC) filtration has proven very effective.<sup>154, 2000</sup>

### ***Future and Planned Usage***

The following recommendations for the future are outlined in the *Water Resources on Oahu*:

- The surface water on the island of Oahu must be studied further.
- If the intent of the BWS to “do no further harm” to existing stream flow, then the planning process is consistent with the environmental concerns that no more water be taken from streams for urban growth.<sup>44, 2001</sup>

### ***Future and Planned Requirements or Changes***

According to the *Water for Life: The History of and Future of Water on Oahu* the Board of Water is committed to finding state-of-the-art, environmentally sound

methods to guarantee the future of Oahu's water. As a part of that commitment the following future goals make Honolulu one of the most livable cities are:

- Involve the community and use community outreach programs to build a sense of water stewardship in the community;
- Develop plans and infrastructure so that Honolulu is the nation's most livable city by the year 2050; and
- Conduct a joint study of West Oahu's watersheds with the Department of Land and Natural Resources and the U.S. Army Corps of Engineers.<sup>153, 2002</sup>

The *General Plan: City and County of Honolulu* lists the following water conservation techniques:

- Low flush toilets, flow restrictors and other water conserving devices in commercial and residential developments;
- Indigenous, drought-tolerant plant material and drip irrigation systems in landscaped areas, and use drip irrigation systems;
- The reuse of treated wastewater effluent for the irrigation of golf courses and other landscaped areas.<sup>28, 1992</sup>

### ***Anticipated Costs for the Future***

The *Report to the World Health Organization* states that for granular activated carbon, the capital costs are approximately \$1,000,000 per 1.0 MGD of average day capacity of raw water treated.<sup>154, 2000</sup>

### ***Problems, Issues and Opportunities Associated with Costs***

#### ***Compare Visitor and Resident Impact***

See Hawaii State Water Summary for information.

#### ***Major Assumptions***

Oahu's urban population and economic activity are increasingly concentrated in the island's leeward areas. According to *Water for Life: The History and Future of Water on Oahu* new technologies such as desalination and water recycling will be needed create supplies to supplement groundwater sources in leeward areas of the island.<sup>153, 2002</sup>

## City and County of Honolulu – Sewage

### ***Present Capacity and Usage***

The *Appendix for Hawaii* discusses wastewater treatment on Oahu. Wastewater for the island of Oahu is treated by centralized wastewater collections systems, small community treatment systems, septic systems, and outdated cesspools. Honolulu and the surrounding suburbs utilize centralized wastewater collection treatment systems. The rural portions of Oahu utilize small community treatment systems, cesspools, and septic systems. There are four sewage outfalls (one each in Honolulu, Honouliuli, Mokapu Peninsula, and Waianae) on the island of Oahu.<sup>157, 2001</sup> (See map and table of wastewater facilities on Oahu in the Appendix.)

The table below is taken from *The State of Hawaii Data Book: A Statistical Abstract* and shows some wastewater statistics for the last decade. The amount of wastewater being treated is approximately the same but the number of treatment plants has decreased.

**Table 2.03 -- Sewage Statistics for Oahu: 1999-2000**

Data limited to systems maintained by the City and County of Honolulu, Department of Environmental Services.

| <b>Year</b> | <b>Sewage treated<br/>2/ (million of<br/>gallons)</b> | <b>Sewage pumped<br/>2/ (millions of<br/>gallons)</b> | <b>Miles of<br/>sewers 2/</b> | <b>City and<br/>County pump<br/>stations</b> | <b>City and County<br/>treatment plants</b> |
|-------------|---|---|-------------------------------|--|---|
| 1990        | 41,763  | 50,858  | 1,828                         | 62   | 13  |
| 1991        | 44,484  | 52,849  | 1,859                         | 64   | 13  |
| 1992        | 42,705  | 53,290  | 1,890                         | 65   | 12  |
| 1993        | 42,415  | 52,480  | 1,914                         | 67   | 11  |
| 1994        | 42,753  | 53,298  | 1,945                         | 69   | 8   |
| 1995        | 43,175  | 53,088  | 1,893                         | 64   | 8   |
| 1996        | 41,403  | 52,114  | 1,910                         | 65   | 8   |
| 1997        | 42,616  | 54,197  | 1,940                         | 63   | 8   |
| 1998        | 41,289  | 50,605  | 1,940                         | 64   | 8   |
| 1999        | 40,750  | 49,379  | 1,970                         | 65   | 8   |
| 2000        | 41,444  | 49,623  | 2,230                         | 65   | 8   |

Source: *2000 State of Hawaii Data Book*

Honolulu Star Bulletin article “Oahu Water Recycling May Expand” discusses the Board of Water Supply 2000 purchase of the Honouliuli Wastewater Reclamation Facility from US Filter Operating Services for \$48.1 million. The facility recycles about 12 million gallons daily that is then sold to industrial and irrigation interests.<sup>158, 2001</sup>

The City of Honolulu made a commitment to the U.S. Environmental Protection Agency and the State Department of Health to reclaim and use up to 10 million gallons per day (MGD) of wastewater island-wide by 2001.

### ***Existing Problems, Issues and Opportunities***

The *Appendix for Hawaii* states potential and alternative water supply sources will have to be considered, including greater use of dike and stream waters, use of sewage effluent for irrigation, blending brackish water with fresh water, and desalting brackish water.

Problems for the Island of Oahu as noted in the *Appendix for Hawaii* include:

- Groundwater and potentially ocean water degradation from failing cesspools and improperly functioning on-site septic systems.
- Homeowners who have access to a centralized wastewater collection system but are not connected.
- Individuals who wish to connect to the centralized wastewater system but who lack the necessary funds to connect.
- Issues with aging wastewater infrastructure such as salt water intrusion into transmission lines.

Opportunities for the Island of Oahu as noted in the *Appendix for Hawaii* include:

- The addition of a water reclamation facility could be a wise monetary and environmental investment. The reclaimed water could be used for a variety of agricultural and non-potable uses.
- A program to aid low-income residents with the fees associated with connection to a centralized wastewater treatment system.<sup>157, 2001</sup>

### ***Future and Planned Usage***

An article published in the Honolulu Star Bulletin states that the Honolulu Board of Water Supply may take over some of the island's sewage plants from the city Department of Environmental Services and convert them into reclamation facilities.<sup>158, 2001</sup>

Oahu's water demands continue to increase. The *Appendix for Hawaii* states that the Honolulu Board of Water Supply is looking for ways to recycle used supplies and should proceed with proposals to convert sewage plants into reclamation facilities. Potential and alternative water supply sources will have to be considered, including greater use of dike and stream waters, use of sewage effluent for irrigation, blending brackish water with fresh water, and desalting brackish water.<sup>157, 2001</sup>

### ***Future and Planned Requirements or Changes***

Analysis of county documents shows future changes include:

- A water reclamation facility that would generate water for agriculture, landscape irrigation, and other non-potable water uses.
- Implement processes that will eliminate or lessen the severity of odors generated at wastewater treatment plants.

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### ***Anticipated Costs for the Future***

The Six-Year CIP and Budget FY2003-2008 appropriates for fiscal year 2002-2003 for sewage collection and disposal. Appropriations for sewage collection and disposal for fiscal years 2003-2008 totals \$599,085,000.

Appropriations for district-sewer improvements for fiscal years 2003-2008 totals \$10,490,000.<sup>245, 2002</sup> See Appendix for detail of expenditures.

### ***Problems, Issues and Opportunities Associated with Costs***

*Recycling Water Is Smart Thinking* states that the city spends millions of dollars to cleanse sewage enough to safely release it into the ocean. With investment in facilities to treat the effluent to a higher cleanliness level, the sewage could be transformed into a salable resource.<sup>159, 2001</sup>

The *Appendix for Hawaii* states that recycling water from sewage produces a quality of reclaimed water that may be less costly for some industries to purify than natural supplies. Water experts estimate that in ten years the demand for water on Oahu will exceed the amount recharged by rainfall. Desalination (removing salt from seawater) is an option, but the process is expensive both in capital and production costs, consumes large amounts of energy and produces wastes that present environmental concerns. Neither large-scale catchments nor dam projects are feasible economically nor environmentally. According to the *Appendix for Hawaii* recycling and conservation are the most economically viable options to assure sustainable water supplies.<sup>157, 2001</sup>

### ***Compare Visitor and Resident Impact***

See Community and Visitor Related Area Summaries for more information.

### ***Major Assumptions***

See City and County of Honolulu Introduction for more information.

## City and County of Honolulu – Solid Waste Disposal

### ***Present Capacity and Usage***

The *East Honolulu Sustainable Communities Plan* describes disposal of solid waste on the Island of Oahu. Solid waste collection, transport, and disposal operations for the Island of Oahu are provided by the City Department of Environmental Services, Refuse Collection and Disposal Division (primarily single family curbside pickup) and private haulers (primarily commercial and multi-family pickup). In addition, individuals can haul their own trash to one of six convenience centers around Oahu. Incineration is performed at the H-POWER plant and accounts for approximately 50 percent of the Oahu’s waste disposal. The City’s sanitary landfill is located at Waimanalo Gulch and has a projected site life to the year 2001. The life of the sanitary landfill at Waimanalo Gulch was recently extend when the county increased the waste level by 30 feet.<sup>93, 2001</sup> (See tables of solid waste statistics and recycling for Oahu in the Appendix.)

The *Long Range Financial Plan and Solid Waste User Fee Study* states that the Division serves approximately 56,700 single-family households in the Honolulu district and approximately 93,500 single-family households in the rural districts.<sup>65, 1999</sup>

Table 2.04 below from the *State of Hawaii Data Book 2000: A Statistical Abstract* lists refuse statistics for the Island of Oahu.

**Table 2.04 -- Refuse Statistics for Oahu: 2001**

| Year | Tons of municipal solid waste delivered |                                 |                               | Sewage treated (millions of gallons) |
|------|---|---------------------------------|-------------------------------|--------------------------------------|
|      | Total                                   | City and County refuse vehicles | Other vehicles                |                                      |
| 2001 | 955,019                                 | 326,696                         | 628,323                       | 40,369                               |
| Year | Sewage pumped (millions of gallons)     | Miles of sewers                 | City and County pump stations | City and County treatment plants     |
| 2001 | 48,626                                  | 2,230                           | 65                            | 8                                    |

Source: 2001 *State of Hawaii Data Book*

### ***Existing Problems, Issues and Opportunities***

The following challenges are outlined in the *General Plan: City and County of Honolulu*:

- Encourage a lowering of the per-capita production of waste; and
- Provide safe, efficient and environmentally sensitive waste-collection and waste-disposal services.<sup>28, 1992</sup>

**Future and Planned Usage**

The *Long Range Financial Plan and Solid Waste User Fee Study* states that the Division’s plan is to convert manual collection single-family households to automated collection by fiscal year 2004. The total number of single-family households for which collection service is provided is projected to increase at 0.33% per year. Total waste collections and disposal is estimated to increase by 1% per year.<sup>65, 1999</sup>

**Future and Planned Requirements or Changes**

See Hawaii State Solidwaste Summary for information.

**Anticipated Costs for the Future**

**Table 2.05 -- Fiscal Year 2002-2003 Funds For Waste Collection And Disposal.**

|   |             |
|---|-------------|
| H-POWER Expansion                               | \$6,000,000 |
| Keehi Transfer Station Pit Floor Rehabilitation | \$ 200,000  |
| Recycling Technology Park                       | \$5,301,000 |

Source: *Long Range Financial Plan and Solid Waste User Fee Study*

Appropriations for waste collection and disposal for fiscal years 2003-2008 totals \$27,001,000.<sup>245, 2002</sup>

**Problems, Issues and Opportunities Associated with Costs**

The *Long Range Financial Plan and Solid Waste User Fee Study* lists revenue sources, which are outlined in Table 2.06.

**Table 2.06: Existing Division Revenue Sources FY1999**

|                             |  |
|-----------------------------|--|
| Small Business Collections  | \$850,000 per year   |
| Commercial Disposal Charges | Cost for disposal at transfer stations and Waimanalo Gulch Landfill are \$92.25/ton & \$65.75/ton respectively |
| H-POWER Disposal Fees       | \$34.00/ton-City and \$65.75/ton-Commercial  |
| H-POWER Electric Sales      | \$27,000,000 per year  |
| H-POWER Lease               | Pursuant to terms of agreement, \$21,056,377 in 1999   |
| Methane Recovery            | \$84,000 per year  |
| Sale of Recycled Material   | \$31,000 per year  |
| Sale of Other Material      | \$24,000 per year beginning in FY2000  |
| Recycling Surcharge         | 6% of disposal fee at the landfill, H-POWER and transfer stations  |
| State Glass Appropriation   | \$1,475,000 per year   |

Source: *Long Range Financial Plan and Solid Waste User Fee Study*

**Compare Visitor and Resident Impact**

See Hawaii State Solidwaste Summary for information.

### ***Major Assumptions***

See Hawaii State Solidwaste Summary for information.

## City and County of Honolulu – Storm Water

### ***Present Capacity and Usage***

*About Honolulu's Clean Water Program* describes the storm water system that takes excessive runoff waters directly into a drainage system. The untreated runoff water ends up in our streams and flows directly into our oceans.

The City and County of Honolulu must conform to a set of Federal rules called the National Pollutant Discharge Elimination System (NPDES) regulations. The NPDES regulations mandate cities with more than 250,000 residents to keep their municipal storm drains and sewer systems as free of pollution as possible. They also require the City and County to educate the public about the new law's requirements.

Day to day management of the storm water program falls under the Engineering Division of the City's Department of Environmental Services. They, in turn, report to the State Department of Health and the Federal Environmental Protection Agency.<sup>160, 2002</sup>

### ***Existing Problems, Issues and Opportunities***

The *About Honolulu's Clean Water Program* discusses water pollution. More than 20 years ago, the Clean Water Act prohibited the discharge of pollutants into surface waters by private and public industries. As a result, industrial pollution waters are largely outdated. However, thousands of small sources of pollution continue to harm our waters each day. This non-point source pollution is more difficult to identify and eliminate. Non-point source pollution may be our most severe environmental problem on Oahu. The City and County of Honolulu established the Clean Water Program to eliminate this problem.<sup>160, 2002</sup>

### ***Future and Planned Usage***

The *Ewa Development Plan* lists principles to guide the development of drainage systems include:

- **Retention and Detention.** Public and private agencies should employ methods of retaining or detaining storm water for gradual release into the ground as the preferred strategy for management of storm water. Where feasible, any open space, including parking lots, landscaped areas, mini and community parks, and public and private golf courses should be used to detain or infiltrate storm water flows to reduce the volume and runoff rates and the amounts of sediments and pollutants transported.
- **Relation to the Regional Open Space Network.** To the extent possible, the developers should integrate planned improvements to the drainage system into the regional open space network by emphasizing the use of retention basins, creation of passive recreational areas, and recreational access for pedestrians and bicycles.<sup>94, 1997</sup>

According to the *About Honolulu's Clean Water Program*, the Department of Environmental Services is already monitoring storm water discharges from drainage areas near residential and industrial areas. They will issue water pollution control guidelines to private sectors, such as construction companies and industrial firms.<sup>160, 2002</sup>

**Future and Planned Requirements or Changes**

The *About Honolulu's Clean Water Program* notes future changes. The Department of Environmental Services guidelines will also be given to managers of high-rise apartment and office buildings and hotels to ensure their residents and guests are complying with the new water pollution control. The City also oversees private connections to the storm sewer system. All new connections will be required to have a permit issued by the Engineering Division. Old connections will be inspected and those with effluent that violates water quality standards will be disconnected. Permits for old connections may have to be reissued to the current property owner with information on current activity.<sup>160, 2002</sup>

**Anticipated Costs for the Future**

The *Six-Year CIP and Budget FY2003-2008* appropriates for fiscal year 2002-2003 funds for flood control are outlined in Table 2.07 below.

**Table 2.07: Fiscal Year 2002-2003 Funds for Flood Control**

| Improvement                       | Estimated Cost |
|-----------------------------------|----------------|
| Kahawainui Stream Flood Control   | \$ 261,000     |
| Kalihi Flood Control Improvements | \$ 81,000      |
| Wailupe Stream Flood Control      | \$1,000,000    |
| Waipahu Flood Control             | \$ 250,000     |

Source: *Six -Year CIP and Budget FY2003-2008*

Appropriations for flood control for fiscal years 2003-2008 totals \$7,467,000.<sup>245, 2002</sup> See Appendix for detail of expenditures.

The *Six-Year CIP and Budget FY2003-2008* appropriates for fiscal year 2002-2003 funds for storm drainage are outlined in Table 2.08 below.<sup>245, 2002</sup>

**Table 2.08: Fiscal Year 2002-2003 Funds for Storm Drainage**

| Improvement                            | Estimated Cost |
|--|----------------|
| Kailua Road Drainage Improvements      | \$960,000      |
| Kamehame Ridge/Mokuhano Street         | \$ 50,000      |
| Storm Drain Outlets in Waikiki Beach   | \$ 70,000      |
| Storm Drain Outlets Near Ala Wai Canal | \$ 30,000      |

Source: *Six-Year CIP and Budget FY2003-2008*

Appropriations for storm drainage for fiscal years 2003-2008 totals \$5,973,000.<sup>245, 2002</sup> See Appendix for detail of expenditures.

### ***Problems, Issues and Opportunities Associated with Costs***

See Hawaii State Storm Water Summary for information.

### ***Compare Visitor and Resident Impact***

The *About Honolulu's Clean Water Program* analysis of county documents shows that rain-washing over streets, parking lots, buildings, and land can pick up toxins, like oil, pesticides, and soil, as it runs along the ground. This storm water runoff drains into storm drains that eventually discharge directly into Oahu's streams and coastal waters. Polluted non-point source wastewater can cause beach closures and discoloring of coastal waters.<sup>160, 2002</sup>

### ***Major Assumptions***

*Recycling Water is Smart Thinking* quotes water experts who estimate that in 10 years demand for water on Oahu will exceed the amount replenished by rain.<sup>159, 2001</sup>

## City and County of Honolulu – Roads

### ***Present Capacity and Usage***

The *Central Oahu Sustainable Communities Plan* notes that planning and development of major roadways is the shared responsibility of the State Department of Transportation and the City Department of Transportation Services. Planning and use of federal transportation funds is coordinated through the Oahu Metropolitan Planning Organization (OMPO), a joint City-State agency. <sup>92, 2002</sup>

*H3: The Island Interstate* describes the three highways on the Island of Oahu. H-1, 27 miles long, connects the Hawaii National Guard at Fort Ruger to the Barbers Point Naval Air Station and runs through the middle of Honolulu. H-2, 8 miles long, joins Pearl Harbor Naval Base and Hickam Air Force Base to Wheeler Air Force Base. H-2 also serves as a partial connection from H-1 to the North Shore of the island. The 15-mile-long H-3 connects the Kaneohe Marine Corps Air Station to the Pearl Harbor defense base, passing through the Koolau Mountains to join the windward towns of Kailua and Kaneohe to the leeward cities of Pearl City and Honolulu. H-3 provides much needed relief to the other two trans-Koolau routes -- the Likelike and Pali highways -- which have long been operating at capacity during the morning and evening rush hours. <sup>156, 1993</sup>

The *2001 State of Hawaii Data Book* gives statistics for traffic volume.

**Table 2.09: Total 24-Hour Traffic Volumes**<sup>252, 2001</sup>

| Site                                      | 1998    | 1999    | 2000    |
|---|---------|---------|---------|
| Pali Highway at tunnels                   | 46,237  | 45,785  | 45,742  |
| Likelike Highway at tunnels               | 32,515  | 31,937  | 30,762  |
| H-1 Freeway at Manoa-Palolo Canal         | 114,395 | 115,205 | 115,239 |
| H-1 Freeway at Kapalama Canal Bridge      | 222,631 | 222,061 | 208,152 |
| Nimitz Highway at Kapalama Canal Bridge   | 71,277  | 75,545  | 79,505  |
| Kalaniana'ole Highway east of Ainakoa Ave | 83,616  | 84,933  | 84,664  |

Source: *2001 State of Hawaii Data Book*

See Appendix for information for an inventory of main roads on the Island of Oahu.

### ***Existing Problems, Issues and Opportunities***

*H3: The Island Interstate* states that in the last 20 years, the population has increased 44% while the number of motor vehicles on the highway has risen 111%. Interstate route H-3 is part of the Hawaii Department of Transportation's (HDOT) integrated long range transportation plan to accommodate the island's growing population. <sup>156, 1993</sup>

The *East Honolulu Sustainable Communities Plan* notes the following existing issues:

- *Traffic Standard Manual*. (Department of Transportation Services, July 1976, as revised). Standards, which are applied to local and most collector streets, need to be revised to reflect transportation policies, principles, and guidelines in the Sustainable Communities Plan.
- *State Highways Division Procedures Manual*, Vol. 8, Chapter 5, Section 4 (State Department of Transportation). These State highway standards need to be reviewed to identify provisions which may conflict with the transportation policies, principles, and guidelines in the Sustainable Communities Plan.<sup>93, 2001</sup>

*State Airports, Harbors and Highways* states that sufficiently-sized entrances/exits to cargo yards, convenient access to major thoroughfares, and the reduction or elimination of traffic congestion are necessary for efficient cargo movement between ship and store.<sup>37, 2001</sup>

The *State of Hawaii Data Book 2001* gives statistics for roadway congestion.

**Table 2.10 -- Roadway Congestion for Honolulu and Average United States**

| Subject                                    | Honolulu |        | U.S Average |        |
|--|----------|--------|-------------|--------|
|  | 1997     | 1999   | 1997        | 1999   |
| Freeway daily vehicle miles travel (1,000) | 5,720    | 5,715  | 15,030      | 15,960 |
| Per lane-mile of freeway                   | 14,300   | 14,290 | 15,240      | 15,890 |
| Annual person hours of delay               | 13,220   | 13,420 | 63,560      | 65,930 |
| Per person                                 | 19       | 19     | 35          | 36     |
| Annual congestion cost:                    |          |        |             |        |
| Per person (dollars)                       | 325      | 345    | 585         | 625    |
| Delay and fuel cost (mil. dol.)            | 230      | 240    | 1,060       | 1,145  |
| Fuel wasted (gal. per person)              | 30       | 30     | (NA)        | 55     |

Source: 2001 *State of Hawaii Data Book 2001*

### **Future and Planned Usage**

State Department of Transportation reports that the county is continuing studies to construct a North-South Road in Ewa between the Kapolei Parkway and Interstate Route-H-1, to improve the H-1 Lunalilo On-Ramp, the Vineyard Boulevard Off-ramp and to widen Interstate Route H-1 between Waiawa and Halawa.<sup>102, 2000</sup>

**Future and Planned Requirements or Changes**

The *State Airports, Harbors and Highways (2001)* lists the following future changes for the roads on the Island of Oahu:

- The improvement of all supporting roadways by widening and the addition of turning and stacking lanes.
- The development of a perimeter roadway around Honolulu Harbor to alleviate traffic on Nimitz Highway.
- Provision of better roadway access to Kapalama Military Reservation.
- Coordination with DOT Highways Division’s proposed Nimitz Highway viaduct project.
- Modification/realignment of the existing roadways at Fort Armstrong and Kewalo Basin.
- A new access road at Barbers Point Harbor.
- A tunnel under Kalihi Channel to replace the Sand Island bridges or a high enough bridge to allow vessels under it.
- A new harbor access road, wide and strong enough for industrial loads, with the requisite lighting and overhead clearances, is planned to connect the Pier P-7 yard to Kalaeloa Boulevard.<sup>37, 2001</sup>

**Anticipated Costs for the Future**

Table 2.11 contains some of the anticipated costs for planned projects in FY2002.

**Table 2.11 -- Anticipated costs for FY2002 projects.**

|   |           |
|---|-----------|
| Undergrounding utilities on Kailua Rd, Phase I      | \$500,000 |
| Undergrounding utilities on Kailua Rd, Phase II     | \$300,000 |
| Haleiwa Main Street, North Shore Facility           | \$400,000 |
| Chinatown lighting improvements/protective barriers | \$200,000 |
| Traffic calming in the area                         | \$150,000 |
| Street lighting on Arizona Road                     | \$ 61,000 |

Source: *Vision Projects FY 2002*

Table 2.12 lists some of the *Six-Year CIP and Budget FY2003-2008* appropriates for fiscal year 2002-2003 funds for traffic improvements.

**Table 2.12: Appropriations for FY2002 Traffic Improvements**

|  |             |
|--|-------------|
| Computerized Traffic Control System                    | \$1,450,000 |
| Kaimuki Business District Parking Master Plan          | \$ 75,000   |
| Traffic Improvements at Lumiaina and Lumiauwau Streets | \$ 48,000   |
| Traffic Study – Hawaii Kai                             | \$ 50,000   |
| Waianae Coast Alternate Route                          | \$3,350,000 |
| Waipio Point Access Road Improvements                  | \$ 150,000  |

Source: *Six-Year CIP and Budget FY2003-2008*

Appropriations for traffic improvements for fiscal years 2003-2008 totals \$60,075,000.<sup>245, 2002</sup> See Appendix for detail of expenditures.

The *Six-Year CIP and Budget FY2003-2008* appropriates for fiscal year 2002-2003 funds for highways, streets and roadways.<sup>245, 2002</sup>

**Table 2.13: Appropriations for FY2002 Highway, Streets, and Roadway Improvements**

|  |              |
|--|--------------|
| Curb Ramps at Various Locations                    | \$14,000,000 |
| Kalaeloa Roadways and Kapolei Parkway Improvements | \$ 150,000   |
| Kalaiohua Place Improvements                       | \$ 836,000   |
| Kalakaua Ave Improvements                          | \$ 111,000   |
| Kalihi Street                                      | \$ 100,000   |
| Kalihi Street Improvements                         | \$ 100,000   |
| Kaonohi St/Moanalua Rd Intersection Improvements   | \$ 500,000   |
| Kapolei Parkway                                    | \$ 500,000   |
| Ke Nui Road Beach Access                           | \$ 175,000   |
| Manana Property Roadway Improvements               | \$ 4,000     |
| Misc. Guardrail Improvements                       | \$ 170,000   |
| Misc. Utility Share Expenses                       | \$ 200,000   |
| Moanalua Road Widening                             | \$ 50,000    |
| North Road Improvements                            | \$ 2,430,000 |
| North-South Road/Park Row Roadway                  | \$ 5,000,000 |
| Pohakupuna Rd and Makule Rd Improvements           | \$ 600,000   |
| Punchbowl Street Improvements                      | \$ 601,000   |
| Rehabilitation of Streets                          | \$ 8,666,000 |
| Salt Lake Blvd Widening                            | \$ 4,500,000 |
| Waikele Road Improvements                          | \$ 215,000   |
| Waipahu Depot Road Extension                       | \$ 101,000   |

Source: *Six-Year CIP and Budget FY2003-2008*

Appropriations for highways, streets and roadways for fiscal years 2003-2008 totals \$280,473,000.<sup>245, 2002</sup> See Appendix for detail of expenditures.

Appropriations for bridges, viaducts and grade separation for fiscal years 2003-2008 totals \$5,865,000.<sup>245, 2002</sup> See Appendix for detail of expenditures.

***Problems, Issues and Opportunities Associated with Costs***

See Hawaii State Roads Summary for information.

***Compare Visitor and Resident Impact***

See Hawaii State Roads Summary for information.

***Major Assumptions***

See Hawaii State Roads Summary for information.

## City and County of Honolulu – Airports

### ***Present Capacity and Usage***

*State Airports, Harbors and Highways* reports that for calendar year 1999, Honolulu International Airport (HIA) was the 21<sup>st</sup> busiest airport in the U.S. and 36<sup>th</sup> in the world.

**Table 2.14 -- Honolulu International Airport**

| Fiscal Year 2001 | Usage        | Percent Change |
|------------------|--------------|----------------|
| Passengers       | 20,151,936   | -12.5%         |
| Cargo            | 275,941 tons | -29.1%         |
| Mail             | 95,899 tons  | -10.9%         |
| Operations       | 327,006      | -5.4%          |

Source: *State Airports, Harbors and Highways*

Airport Revenue Fund retained earnings at beginning of year 2000:

\$1,076,282,823.<sup>37, 2001</sup>

The *State of Hawaii Data Book* lists Honolulu International Airport’s statistics some of which are summarized in Table 2.15 below.

**Table 2.15 -- Rank of HIA in Operations and Enplaned Passengers**

| Year                   | 2000 | 2000       |
|------------------------|------|------------|
| Aircraft operations    | 30   | 345,496    |
| Passenger enplanements | 23   | 11,174,701 |

Source: *2001 State of Hawaii Data Book*

*The Final Statewide Airport System Plan* reports that Honolulu International Airport accounted for 86% of the mail tonnage in 1997 delivered to the island. In 1997, Honolulu accounted for the overwhelming majority of overseas passengers at 80%. In 1995, all international passengers coming to Hawaii arrived at Honolulu International Airport.

Honolulu International Airport has split international arrivals facilities with state-of-the-art operations and security measures that have been implemented to handle international traffic, which has more than doubled over the last twenty years. At the inter-island terminal, the extended Makai pier and new Mauka pier branch outward to provide twenty-two new gates.

The relocation of a major portion of general aviation operations to Kalaeloa Airport has freed additional expansion space at the South ramp. A new commuter terminal has been constructed, and plans are being considered for future relocation of inter-island operations to this area.

Linking the HIA facilities is the automated people mover system, which transports passengers comfortably and efficiently. Wherever possible, the airport boundaries have been expanded. In the North ramp area, this includes the former U.S. Post Office, which has been relocated to the South ramp. Primary fuel storage facilities have been relocated to airport property at Kapalama and Sand Island. Cargo operations of the major carriers have been consolidated in a facility on Ualena Street and Elliot Street, and freight forwarders are concentrated in the South Ramp area.<sup>127, 1998</sup>

### ***Existing Problems, Issues and Opportunities***

See Hawaii State Airports Summary for information.

### ***Future and Planned Usage***

The *Final Statewide Airport System Plan* notes that terminal expansion are needed to keep pace with over 70 percent growth in overseas domestic and international passenger traffic. Plans are underway for the development of a unit terminal development in the Ewa portion of the North Ramp. Future plans to move the inter-island operations to the south ramp are being considered.<sup>127, 1998</sup>

*Hawaii Tourism Product Assessment* states that capital improvement and operational programs at HIA should be recommended and implemented to strengthen Hawaii's first and last impressions (architecture, landscaping, music, lei stands restaurants, sense of aloha, etc.)<sup>91, 1999</sup>

### ***Future and Planned Requirements or Changes***

*Hawaii Tourism Product Assessment* recommended the following changes:

- An upgrade to WikiWiki buses, simplify shuttle and ground transportation options; and
- Redevelopment and beautification of the corridor from Nimitz to Waikiki.
- The third recommendation, improve directional signage has recently been completed.<sup>91, 1999</sup>

The *Final Statewide Airport System Plan* describes major facilities for HIA during the planning period through 2020 in the following sections.<sup>127, 1998</sup>

#### Terminal Area Complex

A plan to extend both the Ewa and Diamond Head concourses to provide additional gates has been considered. International arrival facilities will need to quadruple from their current size to efficiently process over 5,500 peak hour passengers forecast by 2020. Concession upgrading and expansion are needed to maximize revenue generation, and intra-terminal transport improvements will be needed to accommodate demand for passenger movement. Inter-island terminal expansion will be required due to a forecast increase of 43 percent in inter-island traffic through 2020.

### Airfield and Support Facilities

HIA runways and taxiways are expected to be adequate from a dimensional standpoint through 2020. Taxiways for improved ingress and egress will be needed to maintain capacity and minimize delays under growing traffic demands.

### Airport Support and Infrastructure

A new air cargo facility is needed to consolidate operations in anticipation of the projected 88 percent growth in cargo volume through 2020. Existing fuel facilities need to be relocated off-airport and expanded to provide up to 22 days of additional bulk storage capacity. Expanded rent-a-car facilities are needed to address current and future operation requirements.

### International Arrivals Building (IAB):

The requirement for a second IAB is to accommodate existing peak and future foreign passenger arrivals. The ten projects comprising this program will take six years to complete from FY 1998 to FY 2003.

### Renovations to Diamond Head (DH) Concourse:

Will involve four projects and are needed to meet future passenger demand by 2005; improve customer needs and operational efficiency; and improve concession opportunities and use of overall airport space. This program will require four years, starting in FY1999 and ending FY 2003.

### Expansion of Ewa Concourse:

There are three projects proposed to add 7 new gates; new retail and food and beverage locations; and a new cargo facility at Ualena Street. Financing is expected to require three years to complete beginning in FY 2001 and ending FY 2003.<sup>127, 1998</sup>

## ***Anticipated Costs for the Future***

The *Final Statewide Airport System Plan* reports that the total six-year estimated costs for the SASP for the HIA are \$563.768 million. Three major programs will account for over 66% or \$374.501 million of the total \$562.968 million HIA CIP dollars. These programs are the Diamond Head International Arrivals Building, \$250.107 million; renovations to the Diamond Head Concourse, \$109.644 million and expansion of the Ewa Concourse, \$36.900 million.<sup>127, 1998</sup>

## ***Problems, Issues and Opportunities Associated with Costs***

The *Draft Hawaii Statewide Transportation Plan* reports that the Hawaii Revised Statutes requires the DOT to generate revenues sufficient to meet all of the expenditures of the statewide system of airports. State airports are thus developed, operated and maintained on a self-sustaining basis. The three sources of revenue available to the airports division of the DOT are the Airport Special Fund, grants from the federal government through the FAA, and state revenue bonds. Of these, only the Airport Special fund can be used for operation and maintenance on an ongoing basis. All three can be used for capital

improvements. Federal grants can sometimes be used for major non-recurring operations and maintenance expenditures.<sup>101, 2002</sup>

### ***Compare Visitor and Resident Impact***

Honolulu International Airport is the gateway for the State of Hawaii receiving over 80% of overseas passenger arrivals and departures. The airport is heavily impacted both in the main and inter-island terminals by visitors.

### ***Major Assumptions***

The *Final Statewide Airport System Plan* states that Honolulu International Airport (HIA) is projected to remain the principal overseas and international airport in the State of Hawaii. However, its role is expected to be somewhat diminished with increases in direct overseas and international traffic to the Neighbor Islands.

The total number of passengers at HIA is estimated to increase from 21,290,144 in 1992 to 39,216,579 in 2020, with an average annual growth rate of 2.2 percent. Overseas domestic passengers are forecast to increase at HIA from 7,323,463 in 1992 to 11,434,000 by 2020, an average growth of 1.6 percent. International passengers are forecast to increase from 5,345,579 in 1992 to 12,993,000 by 2020, an average annual increase of 3.2 percent and an overall increase 72 percent.

All types of aircraft operations at HIA are expected to increase within the forecast period, except for military operations, which are expected to level off.<sup>127, 1998</sup>

## City and County of Honolulu – Harbors

### **Present Capacity and Usage**

*State Airports, Harbors and Highways* reports activity levels for Honolulu Harbor.

**Table 2.16 – Oahu Harbor Statistics**

|               | Honolulu  | Kalaeoia/Barber’s Point |
|---------------|-----------|-------------------------|
| Passengers    | 85,687    | -                       |
| Cargo in tons | 8,529,255 | 3,192,067               |

Source: 2001 State of Hawaii Data Book

Harbor Special Fund net income 2000 \$23,197,089.<sup>37, 2001</sup>

**Table 2.17 – Oahu Harbor Measurements**

| Island and harbor | Harbor entrance depth (feet) | Depth (feet) | Length (feet) | Width (feet) | Piers (linear feet) | Shedded | Open  |
|-------------------|------------------------------|--------------|---------------|--------------|---------------------|---------|-------|
| Oahu:             |                              |              |               |              |                     |         |       |
| Honolulu          |                              |              |               |              |                     |         |       |
| Main              | } 45                         | 40           | 3,300         | 1,520        | } 29,347            | 1,303   | 9,209 |
| Kapalama          |                              |              | 3,400         | 1,000        |                     |         |       |
| Barbers Point     | 42                           | 38           | 2,100         | 1,800        | 2/ 2,190            | 36      | 1,703 |

Source: 2001 State of Hawaii Data Book

### **Existing Problems, Issues and Opportunities**

*State Airports, Harbors and Highways* states that financial support for non-maritime development of the lands surrounding Honolulu Harbor has declined while the requirements of ocean cargo carriers has increased. Competition for berths has grown rigorous and shippers are concerned about potential delays and the resultant revenue losses. Many bulk cargo vessels require substantial time at berth to complete their operations. Shipping materials by seas will always be a cost effective alternative to air travel.

Ship and boat building will always be limited by the lack of manufacturing facilities and the subsequent cost of transporting parts. <sup>37, 2001</sup>

### **Future and Planned Usage**

*State Airports, Harbors and Highways* lists future usage as follows:

- Container operations are recommended for Pier 1 Kapalama Military Reservation (KMR) and Piers 51-53 on Sand Island.
- Additional need for two berths and 40 acres of cargo yard.

- For safe and efficient operations an additional 120 berths are needed (1 container ship berth, 1 cruise ship berth, 1 auto carrier berth, 6 barge berths, 2 fueling berths, 110 fishing/excursion vessel berths).
- Re-open Kalihi Channel to vessels entering/exiting the harbor.
- Increased use and importance of Barbers Point Harbor.<sup>37, 2001</sup>

### ***Future and Planned Requirements or Changes***

While several recommendations were made regarding future changes, no information was uncovered stating that the changes would be made.

### ***Anticipated Costs for the Future***

No information was discovered regarding anticipated costs for the future.

### ***Problems, Issues and Opportunities Associated with Costs***

*State Airports, Harbors and Highways* notes that the DOT is required by law to generate its own monies to fund programs and projects.<sup>37, 2001</sup>

The *Draft Hawaii Statewide Transportation Plan* reports that financing for the water-related transportation facilities comes from two primary sources. The Harbors Special Fund is used to finance the operations and maintenance as well as the capital improvement program for the harbor system. The state also uses revenue bonds to fund its capital improvement program.<sup>101, 2002</sup>

### ***Compare Visitor and Resident Impact***

Analysis of county documents shows that visitors use Honolulu Harbor for cruise ship visitation. It is important there is a good first impression at Aloha Tower.

### ***Major Assumptions***

*State Airports, Harbors and Highways* lists the following major assumptions:

- The overseas container volume is projected to top 1,338,000 TEUs (twenty-foot equivalent units) in the year 2020.
- The 2020 projections for general cargo total 3,919,800 short tons.<sup>37, 2001</sup>

## City and County of Honolulu – Parks

### ***Present Capacity and Usage***

The total number of parks and recreation areas on the Island of Oahu is 475. (See table and map of park districts and number of parks per district in Appendix.)

|     |                                     |
|-----|-------------------------------------|
| 17  | Regional Parks and Nature Preserves |
| 67  | Beach Park                          |
| 90  | Beach Access Right-Of-Ways          |
| 205 | Community Park                      |
| 91  | Traffic Related Landscaped Areas    |
| 5   | Botanical Gardens                   |

The Department of Parks and Recreation, City and County of Honolulu is authorized in fiscal year 2001 for 1,012.37 full-time equivalent positions, which include full/part-time and temporary employees. The Department is responsible for approximately 6,108 acres of park and recreation.<sup>52, 2001</sup>

*The General Plan: City and County of Honolulu* describes the parks system on the Island of Oahu. The City Department of Parks and Recreation (DPR) classifies parks according to two basic categories: “island-based parks” and “community-based parks.”

Island-based parks serve the needs of the islandwide population. The DPR standard for islandwide parks is eight acres per 1,000 persons. They include regional parks, beach/shoreline parks, beach/shoreline right-of-ways, botanical gardens, golf courses, and zoological parks. The size of the park and the facilities to be provided are based on the character of the site, intended use, and availability.

Community-based parks are intended to provide for active recreation and consist of Neighborhood, Community and District parks. The DPR standard for community-based parks is 2 acres per 1,000 people, although this may vary according to each region’s situation. Community-based parks provide courts and playing fields for various sports and serve a wide array of active sports leagues.<sup>28, 1992</sup>

### ***Existing Problems, Issues and Opportunities***

According to *Oahu in Focus, 2002* Oahu is struggling with the modern problems of a populous island, including traffic congestion, air, and water pollution. The Honolulu area has a large number of high-rise hotels that cater to business conventions as well as tour groups. The city's streets, parks, and beaches are almost always crowded with visitors.<sup>163, 2002</sup>

The *East Honolulu Sustainable Communities Plan* states an issue of concern is that regulations need to be reviewed to determine if passive drainage systems that are designed for recreation use should count toward park dedication requirements, especially in cases where the area would exceed the amount of land that would be required under current rules and regulations.<sup>94, 1997</sup>

### ***Future and Planned Usage***

The *Environmental Report Card 2001* list the City and County of Honolulu, Department of Parks and Recreation Environmental plans for FY 2002: Continue large scale tree planting and major landscaping projects, including medial strips and other traffic related projects. Continue acquisition of open space for parks, scenic vistas, and preservation of natural resource areas  
Complete the island-wide parks master plan.<sup>74, 2001</sup>

The *Central Oahu Sustainable Communities Plan* explains that the primary method of acquiring the needed additional community-based park land will be through the park dedication ordinance. This requires developers to dedicate land for parks and playgrounds (equivalent to 110 square feet per apartment, multi-family building, and planned development project dwelling unit, and 350 square feet per one-family, two family, and duplex unit) as part of the subdivision approval process.<sup>92, 2002</sup>

### ***Future and Planned Requirements or Changes***

*The State Recreation Functional Plan*, DLNR, 1991 contains the following recommendations:

1. Address the problem of saturation of the capacity of beach parks and near shore waters. Acquire additional beach parkland and rights-of-way to remaining undeveloped shorelines to provide increased capacity for future public recreational use. Cite only the pertinent following areas.  
Oahu: Mokuleia (Makaleha Beach), Kahuku
2. Establish near shore underwater areas for non-consumptive activities (e.g. Marine Life Conservation Districts, artificial reefs).
3. More aggressively manage and control the use of existing beach parks.
  - a. Develop and implement an ongoing capacity analysis program including beach counts and analyses to determine appropriate uses and the maximum number of allowable users at a facility (carrying capacity or "limits of acceptable change".)
  - b. Identify heavily stressed beach parks and near shore ocean areas, prioritize them in terms of need for action, carry out capacity analyses, determine appropriate activities, set limits, and develop measures to control use, such as permits, user fees, limiting the number of users, etc.

4. Develop areas mauka of existing beach parks to increase their capacities and to diversify and encourage activities away from the shoreline.
5. Reduce the incidence of ocean recreation accidents. Increase support for water safety programs.
  - a. Determine the effectiveness of enhanced signage at beaches and supplemental educational programs in reducing the number of drownings and near drownings.
  - b. Coordinate water safety information programs targeted at visitors.
6. Resolve conflicts between different activities at heavily used ocean recreation areas. Promote implementation and enforcement of an effective Ocean Recreation Management Plan.
7. Mitigate the impact of increased use of popular ocean recreation areas by visitors. Promote recreational activities for visitors away from popular or heavily used beaches.
8. Plan and develop facilities and areas that feature the natural and historic/cultural resources of Hawaii. Develop interpretive programs for these areas.
9. Proceed with planning, acquisition and development of trails.
  - a. Provide adequate funding on a continuing basis for the Na Ala Hele Program.
  - b. Plan and develop demonstration and priority trails identified by the Na Ala Hele Program.
10. Prevent the loss of access to shoreline and upland recreation areas due to new developments. Prevent blocking of existing shoreline access paths.
  - a. Draft a comprehensive public access code to require the provision of public access to shoreline and mauka recreation areas.
11. Resolve the problem of landowner liability that seriously hampers public access over private lands.
12. Promote and coordinate the development and implementation of environmental education and information programs to address subjects such as litter, vandalism, poaching, anchor damage of coral, depletion of recreational fisheries and destruction of native ecosystems.

Future changes for the island of Oahu as stated in the *Vision Projects* include:

- Asing Park Improvements: Design and construct a new baseball field and dugouts, a dog park, and skate park.
- Kapolei Regional Park: Design and construct a hula mound including grading, irrigation, landscaping, and rockwork to be located at the site in line with Kuahu and map stone on Puuokapolei and Puupalailai at the time of the summer solstice. Also, design and construct a skateboard park and a parking lot.<sup>155, 2002</sup>

### ***Anticipated Costs for the Future***

The Six-Year CIP and Budget FY2003-2008 appropriates for fiscal year 2002-2003 for culture-recreation of \$40,288,000.<sup>245, 2002</sup> See Appendix for detail of expenditures.

For the fiscal year 2001, the Department of Parks and Recreation appropriated \$40,359,471 for its operating budget and \$54,577,000 for capital improvement projects.<sup>52, 2001</sup>

**Table 2.18 -- CIP Budget Department of Parks and Recreation, Fiscal Period July 1, 2000 – December 31, 2000**

| Fund                  | Capital Improvement Appropriation | Expenditures and Encumbered | Balance as of Dec. 31, 2000 |
|-----------------------|-----------------------------------|-----------------------------|-----------------------------|
| Gen. Improvement Bond | \$50,087,500                      | \$0                         | n/a                         |
| Parks and Playground  | \$14,035,975                      | 0                           | n/a                         |
| State Funds           | \$1,000                           | 0                           | n/a                         |
| <b>Total</b>          | <b>\$54,124,475</b>               | <b>\$0</b>                  | n/a                         |

Source: Department of Parks and Recreation

**Table 2.19 -- CIP Expenditures and Encumbrances by fund & function**

| Fund                   | Capital Improvement Appropriation | Expenditures and Encumbered | Balance as of Dec. 31, 2000 |
|------------------------|-----------------------------------|-----------------------------|-----------------------------|
| Planning & Engineering | \$650,000                         | \$0                         | n/a                         |
| Construction           | 38,433,975                        | 0                           | n/a                         |
| Land Acquisition       | 10,153,000                        | 0                           | n/a                         |
| Equipment              | 220,000                           | 0                           | n/a                         |
| Inspection             | 63,000                            | 0                           | n/a                         |
| Design                 | 4,418,500                         | 0                           | n/a                         |
| Relocation             | 146,000                           | 0                           | n/a                         |
| Other                  | 30,000                            | 0                           | n/a                         |
| <b>Total</b>           | <b>\$54,124,475</b>               | <b>\$0</b>                  |                             |

Source: Department of Parks and Recreation

***Problems, Issues and Opportunities Associated with Costs***

According to *Recreation*, the county of Oahu places significant resources into maintaining its parks, municipal golf courses, tennis courts, neighborhood centers and pools, beaches, and camping areas. The funding to maintain these facilities comes from property tax and the facility entrance fees. In general, the entrance fee is not sufficient to cover operating and maintenance costs of a facility; therefore the bulk of the funding comes from property taxes.<sup>162, 2001</sup>

Analysis of county documents shows that park dedications by developers results in neighborhood parks.

***Compare Visitor and Resident Impact***

According to *Recreation*, perhaps a more equitable way to pass on the costs to tourists is through a steeper entrance fee or a visitor tax.<sup>162, 2001</sup> Other issues regarding impacts are crowding at major beach parks, however, no documentation was uncovered to substantiate these claims. It was recommended that each park manager be interviewed for such data.

### ***Major Assumptions***

No information was discovered regarding major assumptions.

## City and County of Honolulu – Police, Fire and Emergency Services

### *Present Capacity and Usage*

The Honolulu Police Department Finance Division describes the police services provided on the Island of Oahu. (See map of police districts in Appendix.)

#### **Police**

The Honolulu Police Department communications center received **1,034,614 calls** for service for the fiscal year 2000-2001. These calls were responded to by **1,979 police officers** in 8 police districts. (Police Districts and Planning districts are not the same. Honolulu’s police district is divided into smaller units than the planning district, while outlying areas are consolidated under larger districts.) The department's jurisdiction is the City and County of Honolulu. It includes the entire island of Oahu, which has a circumference of about 137 miles and an area of some 596 square miles. The estimated resident population is about 867,500, including military personnel but not tourists.

*The Honolulu Police Department Finance Division reports the following department positions outlined in Table 2.20 below.*

**Table 2.20: Honolulu Police Department Staff Budget**

| <b>Proposed Fiscal Year 2003</b> |                   |                   |                     |                  |              |
|----------------------------------|-------------------|-------------------|---------------------|------------------|--------------|
| Positions                        | Actual<br>FY 2001 | Budget<br>FY 2002 | Current<br>Services | Budget<br>Issues | Total        |
| Permanent                        | 2,598             | 2,621             | 2,621               | 12               | 2,633        |
| Temporary                        | 0                 | 0                 | 0                   | 0                | 0            |
| Contract                         | 66                | 66                | 56                  | 0                | 56           |
| <b>Total</b>                     | <b>2,664</b>      | <b>2,687</b>      | <b>2,677</b>        | <b>12</b>        | <b>2,689</b> |

Source: *Honolulu Police Department Finance Division*

Police Districts and Planning Districts are not the same. Urban police districts are divided into smaller units than the planning district, while rural outlying areas are consolidated into larger districts.<sup>165, 2002</sup>

The *Honolulu Police Department 2000 Annual Report* states:

- In the process of upgrading the computer system that links them into the FBI’s National Crime Information Center.
- The computerized mugshot system was upgraded and units were installed in all regional district stations.
- The document imaging system was expanded to include three regional stations so investigators outside of Honolulu are now able to access police reports electronically.

- During the year 2000, the Honolulu Police Department redesigned its radio system to add channels for mobile data computers and installation of all 1,200 units was to be completed sometime in the first half of 2001.
- The Department selected a vendor for the development of new computer aided dispatch and records management systems, which were to be installed in 2001 and 2002, respectively.
- The Department embarked on the path that will take them to accreditation within 18 months.<sup>53, 2000</sup>

Department Organization: Emergency Medical Services Division describes the fire and emergency services provide on the Island of Oahu.

### Fire

The Honolulu Fire Department provides co-response (to emergency service calls) with personnel trained to the first responder level and has an automated defibrillator program. HFD, in addition to fire suppression, coordinates HAZMAT incidents, search and rescue, and vehicle extrication.<sup>164, 1997</sup> (See map of fire battalions for Oahu in Appendix. )

*Communication from the Honolulu Fire Department* states that HFD has **42 fire stations** strategically placed throughout the island of Oahu. This year the HFD has seen an overall 5% increase in EMS responses as well as a 12% increase in rescue responses.<sup>130, 2002</sup>

*The Honolulu Police Department Finance Division* states the number of Fire personnel in FY2001 was **1,136 employees** and in FY2002 and FY2003 budgeted of **1,139 and 1,145 employees** respectively.<sup>165, 2002</sup>

### Emergency Services

There were **54,007 emergency service calls** for the year 2001. The **16 ambulance units**, each associated with either a fire station or a hospital answered these calls. All ambulance units are designated as advanced life support units. The ALS ambulances are staffed with at least one Mobile Intensive Care Technician or Paramedic and a second Paramedic or Emergency Medical Technician. (See map of emergency service bases for Oahu in Appendix.)

There is **one Medevac helicopter** unit based at Wheeler. Six UH-60 Black hawks are utilized, each with a Paramedic and an army Medic.

Included under emergency services are lifeguards. There are **91 full-time lifeguards and 90 – 100 part-time lifeguards**. They cover 19 of the more populated beaches around Oahu. They made **1100 rescues** in the year 2001.<sup>164, 1997</sup>

## ***Existing Problems, Issues and Opportunities***

### **Fire**

Communication from the Honolulu Fire Department states that tourist related incidents impact the HFD in the following areas:

- The HFD responds to a large number of emergency medical responses and rescue calls that are tourism related.
- Language can be a barrier in explaining medical problems and description of an incident.
- Visitors have difficulty providing accurate information on the response location.<sup>130, 2002</sup>

## ***Future and Planned Usage***

### **Emergency Medical Services**

The *State Emergency Medical Services and Injury Prevention* reports that injury prevention and control will be integrated into the State EMS System. Injury prevention is the first phase of an effective EMS System, including public education and pre-hospital medical care from onset of sudden life threatening injury or illness until arrival at an appropriate medical facility.<sup>167, 2001</sup>

## ***Future and Planned Requirements or Changes***

The Governor stated in his State of the State Address that making Hawaii the premier Healthcare Center of the Pacific was a goal. The approval of the University of Hawaii's new \$300 million bio-medical research center in Kakaako was a major step toward this goal. The new school will not only train doctors it will have a strong research component.<sup>166, 2002</sup>

Communication from the Honolulu Fire Department states that all recruits will receive Emergency Medical Technician Basic training so that fire fighters can provide first response medical treatment.<sup>130, 2002</sup>

## ***Anticipated Costs for the Future***

### **Police**

The *Six-Year CIP and Budget FY2003-2008* appropriates for fiscal year 2002-2003 funds for police stations and buildings.

**Table 2.21: Honolulu Police Department CIP and Budget Appropriations**

|   |             |
|---|-------------|
| East Honolulu Police District Station     | \$ 25,000   |
| Police Stations and Building Improvements | \$ 320,000  |
| Police Training Academy Firing Range      | \$5,950,000 |
| Speed Monitor Trailers                    | \$ 25,000   |

Source: *Six-Year CIP and Budget FY2003-2008*

Appropriations for police stations and buildings for fiscal years 2003-2008 totals \$10,500,000.<sup>245, 2002</sup>

**Fire**

Communication from the Honolulu Fire Department (HFD) lists the present cost estimates for HFD apparatus and personnel is as follows:

|                |                   |
|----------------|-------------------|
| Rescue company | \$400.00 per hour |
| Helicopter     | \$500.00 per hour |
| Ladder company | \$300.00 per hour |
| Engine company | \$250.00 per hour |

Due to increases in responsibility (first response medical treatment and responses to weapons of mass destruction, chemical and terrorism threats), payroll, equipment, and materials, the HFD's expenses have and will increase tremendously.<sup>130, 2002</sup>

The *Six-Year CIP and Budget FY2003-2008* appropriates for fiscal year 2002-2003 funds for fire stations and buildings.

**Table 2.22: Honolulu Fire Department CIP and Budget Appropriations**

|   |           |
|---|-----------|
| Fire Station Building Improvements      | \$400,000 |
| Fire Training Center                    | \$103,000 |
| Hauula Fire Station Relocation          | \$ 2,000  |
| Hawaii Kai Fire Station #34 Renovations | \$ 60,000 |
| McCully Fire Station                    | \$590,000 |

Source: *Six-Year CIP and Budget FY2003-2008*

Appropriations for fire stations and buildings for fiscal years 2003-2008 totals \$21,730,000.<sup>245, 2002</sup>

**Emergency Medical Services**

The *Six-Year CIP and Budget FY2003-2008* appropriates for fiscal year 2002-2003 funds for other protection.<sup>245, 2002</sup>

**Table 2.23: Emergency Medical Services CIP and Budget Appropriations**

|   |           |
|---|-----------|
| EMS Headquarters and Communication Facility | \$900,000 |
| Kapolei Ambulance Unit Facility             | \$656,000 |
| Lifeguard Towers                            | \$600,000 |
| Wahiawa Ambulance Unit Facility             | \$125,000 |

Source: *Six-Year CIP and Budget FY2003-2008*

***Problems, Issues and Opportunities Associated with Costs***

**Fire**

Communication from the Honolulu Fire Department states that due to the present length downturn in the economy and the City and County of Honolulu's budget crisis, the HFD may realize additional cuts in the projected budget; however, the number of incident responses is projected to rise without increasing personnel or equipment. The HFD does not recover costs from tourist-related incidents.<sup>130, 2002</sup>

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## ***Compare Visitor and Resident Impact***

### **Fire**

Communication from the Honolulu Fire Department reports that the majority of HFD rescue responses are visitor-related due to their unfamiliarity of the island's terrain and ocean currents.<sup>130, 2002</sup>

### **Emergency Medical Services**

The City and County of Honolulu Emergency Medical Services Division provides 24 hour quality pre-hospital emergency medical care and services to residents and visitors on Oahu.<sup>164, 1997</sup>

## ***Major Assumptions***

### **Fire**

Communication from the Honolulu Fire Department gives major assumptions. The downturn in visitor arrivals appears to be stabilizing. Visitor arrivals are expected to improve, which will result in an increase in HFD responses to tourist-related incidents; however, due to the City's economic concerns, the HFD does not anticipate receiving additional funds.<sup>130, 2002</sup>

## City and County of Honolulu – Visitor Accommodations

### ***Present Capacity and Usage***

The *State of Hawaii Data Book 2001: A Statistical Abstract* gives tax rates and job count for the visitor accommodation industry. <sup>252, 2001</sup>

**Table 2.24: Visitor Accommodations:2001**

|                 | Properties | Units  |
|-----------------|------------|--------|
| Apartment       | 15         | 647    |
| Bed & Breakfast | 15         | 42     |
| Condo Hotel     | 25         | 3245   |
| Hostel          | 7          | 321    |
| Vacation Unit   | 48         | 269    |
| Other           | 13         | 754    |
| Total           | 205        | 36,824 |

Source: *2001 Visitor Plant Inventory*

The *2001 Visitor Plant Inventory* describes that 28.1 percent of Oahu’s visitor accommodations are in the Deluxe and Luxury classes. <sup>80, 2001</sup>

**Table 2.25: Visitor Accommodations by Nightly Price: 2000**

Budget (up to \$100), Standard (\$101-250), Deluxe (\$251-500) and Luxury (\$501+)

| Island and type of accommodation |       |
|----------------------------------|-------|
| Budget                           | 8984  |
| Standard                         | 17106 |
| Deluxe                           | 9169  |
| Luxury                           | 1010  |
| Total                            | 36269 |

Source: *2001 Visitor Plant Inventory*

**Table 2.26: Hotel room occupancy and room rates: 2000**

|             | Percent occupied |
|-------------|------------------|
| State total | 77.19            |
| Oahu        | 79.00            |
| Waikiki     | 79.53            |
| Other Oahu  | 74.05            |

Source: *2001 State of Hawaii Data Book*

**Table 2.27 – Visitor Accommodations by District and Unit: 2001**

|                    |                          |               |              |
|--------------------|--------------------------|---------------|--------------|
| AIRPORT            | HOSTEL                   | 1             | 20           |
|                    | HOTEL                    | 4             | 718          |
|                    | <b>TOTAL</b>             | <b>5</b>      | <b>738</b>   |
| ALA MOANA          | HOSTEL                   | 1             | 114          |
|                    | HOTEL                    | 2             | 1,514        |
|                    | OTHER                    | 1             | 19           |
|                    | <b>TOTAL</b>             | <b>4</b>      | <b>1,647</b> |
| LEEWARD/MAKAHA     | APARTMENT/ HOTEL         | 2             | 45           |
|                    | BED & BREAKFAST          | 1             | 4            |
|                    | CONDOMINIUM HOTEL        | 2             | 111          |
|                    | HOTEL                    | 1             | 387          |
|                    | INDIVIDUAL VACATION UNIT | 5             | 52           |
|                    | OTHER                    | 1             | 348          |
|                    | <b>TOTAL</b>             | <b>12</b>     | <b>947</b>   |
| NORTH SHORE        | CONDOMINIUM HOTEL        | 1             | 50           |
|                    | HOTEL                    | 3             | 725          |
|                    | INDIVIDUAL VACATION UNIT | 16            | 29           |
|                    | OTHER                    | 3             | 17           |
|                    | <b>TOTAL</b>             | <b>23</b>     | <b>821</b>   |
| OTHER HONOLULU     | BED & BREAKFAST          | 2             | 10           |
|                    | HOSTEL                   | 1             | 40           |
|                    | HOTEL                    | 3             | 513          |
|                    | INDIVIDUAL VACATION UNIT | 6             | 6            |
|                    | <b>TOTAL</b>             | <b>12</b>     | <b>569</b>   |
| WAIKIKI/HONOLULU   | APARTMENT/ HOTEL         | 13            | 602          |
|                    | BED & BREAKFAST          | 1             | 7            |
|                    | CONDOMINIUM HOTEL        | 22            | 3,084        |
|                    | HOSTEL                   | 4             | 147          |
|                    | HOTEL                    | 68            | 27,665       |
|                    | INDIVIDUAL VACATION UNIT | 5             | 149          |
|                    | OTHER                    | 4             | 362          |
| <b>TOTAL</b>       | <b>117</b>               | <b>32,016</b> |              |
| WINDWARD           | BED & BREAKFAST          | 11            | 21           |
|                    | HOTEL                    | 1             | 24           |
|                    | INDIVIDUAL VACATION UNIT | 16            | 33           |
|                    | OTHER                    | 4             | 8            |
|                    | <b>TOTAL</b>             | <b>32</b>     | <b>86</b>    |
| <b>O'AHU TOTAL</b> | <b>205</b>               | <b>36,824</b> |              |

Source: 2001 Visitor Plant Inventory

### ***Existing Problems, Issues and Opportunities***

Analysis of county documents shows that visitor accommodations are privately owned and operated. Information on existing issues was not available from county documents.

### ***Future and Planned Usage***

The *Population and Economic Projections for the State of Hawaii to 2025* lists visitor industry key statistical projections.<sup>84, 2000</sup>

**Table 2.28 – Visitor Accommodations Projections**

|   | 2000   | 2005   | 2010   | 2015   | 2020   | 2025    |
|---|--------|--------|--------|--------|--------|---------|
| Ratio between average daily census and occupied visitor rooms |        |        |        |        |        |         |
| State   | 3.1    | 3.1    | 3.2    | 3.2    | 3.2    | 3.2     |
| Oahu  | 2.8    | 2.8    | 2.9    | 2.9    | 2.9    | 2.9     |
| Number of occupied visitor rooms                              |        |        |        |        |        |         |
| State   | 54,256 | 62,685 | 68,483 | 75,197 | 82,567 | 90,657  |
| Oahu  | 28,242 | 32,380 | 35,131 | 38,426 | 42,027 | 45,964  |
| Share of occupied visitor rooms (%)                           |        |        |        |        |        |         |
| Oahu  | 52.1   | 51.7   | 51.3   | 51.1   | 50.9   | 50.7    |
| Minimum hotel occupancy rate when new hotels are needed (%)   |        |        |        |        |        |         |
| State   | 75.9   | 81.7   | 82.5   | 82.8   | 83.0   | 83.0    |
| Oahu  | 78.0   | 82.0   | 82.5   | 83.0   | 83.0   | 83.0    |
| Number of visitor rooms demanded                              |        |        |        |        |        |         |
| State   | 71,480 | 76,744 | 83,010 | 90,867 | 90,479 | 109,226 |
| Oahu  | 36,206 | 39,488 | 42,584 | 46,296 | 50,635 | 55,378  |
| Number of Visitor rooms (avg. annual growth rate, %)          |        |        |        |        |        |         |
| State   | 0.0    | 1.4    | 1.6    | 1.8    | 1.8    | 1.9     |
| Oahu  | 0.0    | 1.8    | 1.5    | 1.7    | 1.8    | 1.8     |

Source: 2001 Visitor Plant Inventory

According to the 2001 Visitor Plant Inventory, planned additions to visitor accommodations include:

- Aloha Tower Redevelopment Project – up to 350 hotel units, status - on hold
- Former Sheraton Makaha – 70 hotel units
- Ko Olina Beach Club – 750 timeshare units
- Ko Olina Resort and Marina – up to 2950 timeshare units, 4000 hotel units
- Kuilima Resort – unknown
- Ocean Pointe – 950 hotel units
- Pacific Basin Conference Resort – 300 hotel units
- Waikiki Beach Walk – total 233 hotel units
- Waikikian Tower – 350 timeshare units.

### ***Future and Planned Requirements or Changes***

Analysis of county documents shows that visitor accommodations are privately owned and operated. Information on future changes was not available from county documents.

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### ***Anticipated Costs for the Future***

Analysis of county documents shows that visitor accommodations are privately owned and operated. Information on future costs was not available from county documents.

### ***Problems, Issues and Opportunities Associated with Costs***

Analysis of county documents shows that visitor accommodations are privately owned and operated. Information on problems, issues and opportunities with future costs was not available from county documents.

### ***Compare Visitor and Resident Impact***

Analysis of county documents shows that the Island of Oahu is the most heavily impacted by tourism. Visitor accommodations are concentrated with the Primary Urban Center Sustainable Community. The decrease in visitation caused by the terror attacks on September 11, 2001 is slow reversing though visitors are not spending as much.

### ***Major Assumptions***

See City and County of Honolulu Introduction for more information.

## City and County of Honolulu – Private Transportation

### ***Present Capacity and Usage***

According to the *State of Hawaii Data Book 2001: A Statistical Abstract*, in 2001, the Island of Oahu had 1,636 licensed taxicabs. In 2000, there were 1,359 and in 1999, 1,213.

Oahu has the most registered taxicabs in the State of Hawaii. <sup>65, 2001</sup>

According to the *Pacific Business News: 2002 Book of Lists*, the following transportation companies operated business on Oahu, as well as other islands.

**Table 2.30 -- Ground Transportation Companies Operating on Oahu**

| Company Name                         | Islands Served                | Number of vehicles in company fleet | Makes and Models   |
|--------------------------------------|-------------------------------|-------------------------------------|--|
| Roberts Hawaii Tours, Inc            | Oahu, Maui, Kauai, Big Island | 330                                 | vans, motorcoaches, mini-buses, trolleys, sedans, limousines |
| V.I.P Transportation, Inc.           | Oahu                          | 65                                  | vans, motorcoaches, mini-buses, limousines                   |
| Polynesian Adventure Tours           | Oahu, Maui, Kauai, Big Island | 120                                 | vans, motorcoaches, mini-buses                               |
| PHT, Inc. dba Polynesian Hospitality | Oahu, Maui, Big Island        | DND                                 | Prevost and LeMirage series                                  |
| RDH Transportation Services, Inc.    | Oahu                          | 41                                  | MCI Renaissance, Van Pool                                    |
| Elite Limousine Services, Inc.       | Oahu                          |                                     | sedans, limousines   |
| Duke's Limousine, Inc.               | Oahu                          | 15                                  | sedans, limousines   |

Source: Pacific Business News 2001 Book of Lists

### ***Existing Problems, Issues and Opportunities***

Analysis of county documents shows that visitor accommodations are privately owned and operated. Information on existing issues was not available from county documents.

### ***Future and Planned Usage***

The *Primary Urban Center General Plan* states a transit link along the Ala Moana/Kakaako/Downtown corridor as a planned usage for at-grade trolley type vehicles that are publicly or privately operated. <sup>241, 2002</sup>

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### ***Future and Planned Requirements or Changes***

Analysis of county documents shows that private transportation facilities are privately owned and operated. Information on future requirements was not available from county documents.

### ***Anticipated Costs for the Future***

Analysis of county documents shows that private transportation facilities are privately owned and operated. Information on future costs was not available from county documents. Private industry will expand as demand requires.

### ***Problems, Issues and Opportunities Associated with Costs***

Analysis of county documents shows that private transportation facilities are privately owned and operated. Information on issues associated with costs was not available from county documents.

### ***Compare Visitor and Resident Impact***

Analysis of county documents shows that the private transportation sector heavily supports the visitor industry. Private Transportation is used more by visitors than by residents.

### ***Major Assumptions***

Analysis of county documents shows that private transportation facilities are privately owned and operated. Information on major assumptions was not available from county documents.

## City and County of Honolulu – Energy Systems

### ***Present Capacity and Usage***

The *Primary Urban Center General Development Plan* states that Hawaiian Electric Company (HECO) operates the electrical utility serving Oahu through an integrated islandwide system and that HECO maintains two power plants within the Primary Urban Center, in Waiau and central Honolulu.<sup>241, 2002</sup>

The *East Honolulu Sustainable Communities Plan* states that growth policies in the General Plan of the City and County of Honolulu directs significant residential growth to the Primary Urban Center, Ewa, and Central Oahu Development Plan Areas.<sup>93, 2001</sup>

**Table 2.31 -- Service Provided by Hawaiian Electric Company, Inc., on Oahu: 1990 to 2000**

| Year | Number of customers, Dec. 31 |                  | Net input (1,000 kWh) | Electricity sales (1,000 kWh) | Average annual residential use (kWh) | Average residential rate (dollars per kWh) | Generating capability Dec. 31 (kW) |
|------|------------------------------|------------------|-----------------------|-------------------------------|--------------------------------------|--|------------------------------------|
|      | Total                        | Residential only |                       |                               |                                      |  |                                    |
| 1990 | 248,692                      | 217,681          | 6,835,025             | 6,470,587                     | 7,620                                | 0.09228                                    | 1,262,000                          |
| 1991 | 255,176                      | 223,304          | 6,876,964             | 6,538,952                     | 7,610                                | 0.09354                                    | 1,440,000                          |
| 1992 | 257,442                      | 225,229          | 7,061,157             | 6,650,449                     | 7,711                                | 0.09925                                    | 1,666,000                          |
| 1993 | 263,478                      | 230,192          | 7,029,839             | 6,607,424                     | 7,581                                | 0.11414                                    | 1,669,000                          |
| 1994 | 264,992                      | 232,115          | 7,222,978             | 6,797,364                     | 7,681                                | 0.11342                                    | 1,669,000                          |
| 1995 | 269,307                      | 235,905          | 7,359,195             | 6,962,794                     | 7,732                                | 0.12302                                    | 1,669,000                          |
| 1996 | 271,602                      | 237,860          | 7,499,202             | 7,091,147                     | 7,868                                | 0.12944                                    | 1,669,000                          |
| 1997 | 271,801                      | 238,825          | 7,424,259             | 7,040,291                     | 7,773                                | 0.13360                                    | 1,669,000                          |
| 1998 | 272,675                      | 239,945          | 7,299,149             | 6,938,326                     | 7,603                                | 0.12556                                    | 1,669,000                          |
| 1999 | 275,467                      | 242,579          | 7,356,725             | 6,997,936                     | 7,654                                | 0.12741                                    | 1,669,000                          |
| 2000 | 278,260                      | 245,027          | 7,589,409             | 7,211,760                     | 7,793                                | 0.14477                                    | 1,669,000                          |

Source: 2001 *State of Hawaii Data Book*

The *General Plan: City and County of Honolulu* describes the energy systems in North Shore. Power provided by Hawaiian Electric (HECO) facilities via transmission lines, to 3 sub-stations located in Waialua, Waimea, and Kuilima.<sup>28, 1992</sup>

### ***Existing Problems, Issues and Opportunities***

The *Central Oahu Sustainable Communities Plan* states that HECO forecasts that increased demand and the proposed retirement of the Honolulu Power Plant

from service will create a need for additional island-wide power generation capacity by 2020.<sup>92, 2002</sup>

### ***Future and Planned Usage***

The *General Plan: City and County of Honolulu* gives the objectives for energy systems on the Island of Oahu.

#### **Policies to maintain an adequate, dependable, and economical supply of energy for Oahu residents.**

- Develop and maintain a comprehensive plan to guide and coordinate energy conservation and alternative energy development and utilization programs on Oahu.
- Establish economic incentives and regulatory measures, which will reduce Oahu's dependence on petroleum as its primary source of energy.
- Support programs and projects that contribute to the attainment of energy self-sufficiency on Oahu.
- Promote and assist efforts to establish adequate petroleum reserves within Hawaii's boundaries.
- Give adequate consideration to environmental, public health, and safety concerns, to resource limitations, and to relative costs when making decisions concerning alternatives for conserving energy and developing natural energy resources.
- Work closely with the State and Federal governments in the formulation and implementation of all City and County energy-related programs.

#### **Policies to conserve energy through the more efficient management of its use.**

- Ensure that the efficient use of energy is a primary factor in the preparation and administration of land use plans and regulations.
- Provide incentives and, where appropriate, mandatory controls to achieve energy efficient siting and design of new developments.
- Carry out public, and promote private, programs to more efficiently use energy in existing buildings and outdoor facilities.
- Promote the development of an energy efficient transportation system.

#### **To fully utilize proven alternative sources of energy.**

- Encourage the use of commercially available solar energy systems in public facilities, institutions, residences, and business developments.
- Support the increased use of operational solid waste energy recovery and other biomass energy conversion systems.

#### **To develop and apply new, locally available energy resources.**

- Support and participate in research, development, demonstration, and commercialization programs aimed at producing new, economical, and environmentally sound energy supplies from alternative sources.

- Secure State and Federal support of City and County efforts to develop new sources of energy.

**To establish a continuing energy information program.**

- Supply citizens with the information they need to fully understand the potential supply, cost, and other problems associated with Oahu's dependence on imported petroleum.
- Foster the development of an energy conservation ethic among Oahu residents.
- Keep consumers informed about available alternative energy sources and their costs and benefits.
- Provide information concerning the impact of public and private decisions on future energy use.<sup>28, 1992</sup>

The *Central Oahu Sustainable Communities Plan* states public agencies will work with the community (residents, businesses, developers, and landowners) to address current deficiencies in roads, schools, and parks and to create adequate infrastructure to meet the needs of the residential and working population of the area.<sup>92, 2002</sup>

The *General Plan: City and County of Honolulu* describes the energy systems in North Shore. Power provided by Hawaiian Electric (HECO) facilities via transmission lines, to 3 sub-stations located in Waialua, Waimea, and Kuilima.<sup>28, 1992</sup>

***Future and Planned Requirements or Changes***

The *Ewa Development Plan* states major system improvements -- such as development of a new power generating plant and/or major new transmission lines -- should be analyzed and approved based on islandwide studies and siting evaluations. Strong consideration should be given to placing any new transmission lines underground.

Electrical power plants should generally be located in areas shown as planned for Industrial use and away from Residential areas shown on the Urban Land Use Map. Any proposed major new electrical power plant or proposals for a new above-ground or underground transmission corridor carrying voltages of 138kV or greater shall be considered through a City review and approval process, such as the Plan Review Use process, which provides public review, complete analysis, and approval from the Department of Land Utilization and the City Council.<sup>94, 1997</sup>

The *General Plan: City and County of Honolulu* lists the planned changes in North Shore energy systems:

- HECO has immediate plans to upgrade Mokuleia communication site.
- HECO plans to upgrade & construct additional facilities, including a 46 kilavolt sub-transmission line to meet increasing future demands.

- Locate underground power lines away from Kamehameha Highway.<sup>28, 1992</sup>

The *Primary Urban Center General Development Plan* states that HECO proposes a back-up system consisting of several transmission line loops over alternative routes. One component is the proposed 138kV transmission line connecting the Kamoku and Pukele substations, whose route would traverse the PUC.<sup>241, 2002</sup>

### ***Anticipated Costs for the Future***

The Six-Year CIP and Budget FY2003-2008 appropriates for fiscal year 2002-2003 \$2,390,000 for energy conservation improvements to plan, design, and construct energy conservation measures.<sup>245, 2002</sup>

The Six-Year CIP and Budget FY2003-2008 appropriates for fiscal year 2002-2003 \$50,000 for utilities relocation and undergrounding of overhead utilities.<sup>245, 2002</sup>

### ***Problems, Issues and Opportunities Associated with Costs***

No information was discovered regarding the problems, issues and opportunities associated with costs.

### ***Compare Visitor and Resident Impact***

No information was discovered regarding the comparison of visitor and resident impact.

### ***Major Assumptions***

No information was discovered regarding major assumptions.

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## **City and County of Honolulu – Sewer Systems**

### ***Present Capacity and Usage***

See Hawaii State and City and County of Honolulu Sewage Summaries for more information.

### ***Existing Problems, Issues and Opportunities***

See Hawaii State and City and County of Honolulu Sewage Summaries for more information.

### ***Future and Planned Usage***

See Hawaii State and City and County of Honolulu Sewage Summaries for more information.

### ***Future and Planned Requirements or Changes***

See Hawaii State and City and County of Honolulu Sewage Summaries for more information.

### ***Anticipated Costs for the Future***

See Hawaii State and City and County of Honolulu Sewage Summaries for more information.

### ***Problems, Issues and Opportunities Associated with Costs***

See Hawaii State and City and County of Honolulu Sewage Summaries for more information.

### ***Compare Visitor and Resident Impact***

See Hawaii State and City and County of Honolulu Sewage Summaries for more information.

### ***Major Assumptions***

See Hawaii State and City and County of Honolulu Sewage Summaries for more information.

## City and County of Honolulu – Coastal Water Quality

### ***Present Capacity and Usage***

The *Primary Urban Center Development Plan* describes natural resource elements such as stream segments and wetlands. The few remaining wetlands are located near Pearl Harbor and are protected by Federal regulations. Most urban stream channels have been hardened with concrete and stone structures, and their banks are often devoid of vegetation.

Portions of important streams that flow through Honolulu – Manoa Stream, Nuuanu Stream, Moanalua Stream, and Kapalama Stream – have greenbelts and/or parallel pathways already in place.<sup>241, 2002</sup> (See coastal water quality map and streams and conservation areas for Oahu in Appendix.)

### ***Existing Problems, Issues and Opportunities***

The *State of Hawaii 303(d) List of Water Quality Limited Waters* reports contaminated water bodies, pollutants and their probable sources.

**Table 2.32 -- Water Quality Limited Waters – 1998<sup>202, 1998</sup>**

| <b>Water body Segment</b> | <b>Pollutants</b>   | <b>Probable Source</b>                 |
|---------------------------|---|--|
| Ala Wai Canal             | Nutrients, Metals, Suspended solids, Pathogens, Turbidity | Urban runoff<br>Natural sources        |
| Honolulu Harbor           | Nutrients, Metals, Suspended solids, Pathogens, Turbidity | Urban runoff                           |
| Kahana Bay                | Suspended solids, Turbidity                               | Natural sources                        |
| Kaneohe Bay               | Nutrients, Suspended solids, Turbidity                    | Urban runoff<br>Agriculture            |
| Keehi Lagoon              | Nutrients, Suspended solids, Turbidity                    | Urban runoff                           |
| Kewalo Basin              | Nutrients, Suspended solids, Turbidity                    | Urban runoff                           |
| Pearl Harbor              | Nutrients, Suspended solids, Turbidity                    | Urban runoff<br>Agriculture            |
| Waialua-Kaiaka Bays       | Nutrients, Suspended solids, Turbidity                    | Urban runoff<br>Agriculture            |
| Kapaa Stream              | Nutrients, Metals<br>Suspended solids, Turbidity          | Landfill leachate<br>Industrial runoff |
| Kawa Stream               | Nutrients, Suspended solids, Turbidity                    | Urban runoff<br>Agriculture            |
| Waimanalo Stream          | Nutrients, Suspended solids, Turbidity                    | Urban runoff<br>Agriculture            |

Source: *State of Hawaii 303(d) List of Water Quality Limited Waters*

The *Primary Urban Center Development Plan* states the cumulative impact of greater lot coverage threatens to erode natural stream banks downstream. Polluted storm water runoff from agriculture, urban development, recreational boating and marinas, and wetlands activities are the leading cause of water pollution in Hawaii State waters.

Studies of Mamala Bay have determined that urban runoff entering the Bay from subembayments such as Pearl Harbor, Keehi Lagoon-Honolulu Harbor, Kewalo Basin, and the Ala Wai Canal are the most significant contributor to the pollution of nearshore waters. The control and management of urban watersheds and protection of its coastal water quality are the leading storm water management issues in the PUC.

The Ala Wai Canal is a significant contributor of pollutants to the beaches and nearshore waters of Waikiki.<sup>241, 2002</sup>

### ***Future and Planned Usage***

The *General Plan: City and County of Honolulu* lists existing issues as:

- Protect the natural environment from damaging levels of air, water, and noise pollution
- Coordinate City and County health codes and other regulations with State and Federal Health codes to facilitate the enforcement of air, water, and noise pollution controls.
- Encourage ocean and water oriented recreation activities that do not adversely impact on the natural environment.
- Encourage the safe use of Oahu's ocean environments.<sup>28, 1992</sup>

### ***Future and Planned Requirements or Changes***

No information was discovered regarding future and planned requirements or changes for coastal water quality.

### ***Anticipated Costs for the Future***

No information was discovered regarding anticipated costs for the future for coastal water quality.

### ***Problems, Issues and Opportunities Associated with Costs***

No information was discovered regarding problems, issues and opportunities associated with costs for coastal water quality.

### ***Compare Visitor and Resident Impact***

The *Primary Urban Center General Development Plan* describes that the PUC is highly urbanized and relies heavily on the attractiveness of its coastal waters and beaches for tourism, recreational and cultural uses.<sup>241, 2002</sup>

### ***Major Assumptions***

No information was discovered regarding major assumptions for coastal water quality.

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## **City and County of Honolulu – Marine Ecosystem Health**

### ***Present Capacity and Usage***

Much of the information for Marine Ecosystem Health and Coastal Water Quality has been combined. Therefore, it has been written up in the City and County of Honolulu Coastal Water Summaries. Also see Hawaii State Marine Ecosystem Health for information. (See fishery monitoring sites and coral reef monitoring sites for Oahu in the Appendix.)

### ***Existing Problems, Issues and Opportunities***

See Hawaii State and City and County of Honolulu Coastal Water Summaries for information.

### ***Future and Planned Usage***

See Hawaii State and City and County of Honolulu Coastal Water Summaries for information.

### ***Future and Planned Requirements or Changes***

See Hawaii State and City and County of Honolulu Coastal Water Summaries for information.

### ***Anticipated Costs for the Future***

See Hawaii State and City and County of Honolulu Coastal Water Summaries for information.

### ***Problems, Issues and Opportunities Associated with Costs***

See Hawaii State and City and County of Honolulu Coastal Water Summaries for information.

### ***Compare Visitor and Resident Impact***

See Hawaii State and City and County of Honolulu Coastal Water Summaries for information.

### ***Major Assumptions***

See Hawaii State and City and County of Honolulu Coastal Water Summaries for information.

## City and County of Honolulu – Forestry / Green Space

### ***Present Capacity and Usage***

The *2001 State of Hawaii Data Book: A Statistical Abstract* states the City and County of Honolulu contains 209 acres of woodland on farms.

**Table 2.33 -- Forest and Natural Area Acreage: 2001**

| Island      | Conservation district forest land |                     | Natural areas   |         |
|-------------|-----------------------------------|---------------------|-----------------|---------|
|             | Forest reserve land               | Private forest land | Number of areas | Acres   |
| State total | 643,134                           | 328,742             | 19              | 109,164 |
| Oahu        | 32,462                            | 88,817              | 3               | 1,770   |

Source: *2001 State of Hawaii Data Book*

The Lowland Mesic Forests describes the three natural reserves on the Island of Oahu.

#### Pahole (658 acres, established in 1981)

This reserve encompasses a complex valley system in the northern Waianae Mountains. The area is known for its natural diversity and extends from the summit ridge down to the dry lowlands. The reserve contains a rare dry forest, a rare mesic forest and is home to endangered Hawaiian tree snails. Other lowland mesic forests and dry shrublands, as well as a Hawaiian intermittent stream community are represented.

#### Kaala (1,100 acres, est. 1981)

Kaala is the highest point on the island of Oahu (4,020 ft.) and is found in the northern section of the Waianae Mountain Range. The fog-shrouded reserve features steep, wet slopes that descend from a mountain bog to semi-wet foothills. This reserve contains some of the rarest plants in Hawaii.

#### Kaena Point (12 acres, est. 1983)

The dry, windswept coastal dunes of Kaena are found at the western most point of Oahu. Situated at the base of sea cliffs of the Waianae Mountains, the reserve protects coastal dry shrublands and rare coastal plants. It is also a nesting area for the Laysan albatross and is occasionally visited by Hawaiian monk seals. Humpback whales and several species of seabirds often can be spotted offshore from this reserve.<sup>126, 2002</sup>

The Koolau Poko Sustainable Communities Plan describes the Koolau Greenbelt. It is the transition area between the Koolau Mountain Range and the urban agricultural uses in the valleys and on the coastal plain. Much of this area is presently undeveloped or used for open space purposes, including nature parks/preserves or golf courses. The purposes of designating the remainder of this area as greenbelt are to preserve this natural, recreational and scenic

resource; maintain significant view corridors; to prevent inappropriate development or use which may cause hazards or other undesirable environmental consequences downstream; and to provide opportunities for environmental and cultural research and education.<sup>66, 2000</sup>

The *General Plan: City and County of Honolulu* describes forestry and green space on the North Shore as:

- Mountain areas include the North Shore,
- Designated as preservation areas,
- Forest contain watersheds areas,
- Most are open to public for recreational use.<sup>28, 1992</sup>

The *Primary Urban Center General Development Plan* describes that the mountains and shorelines are the dominant elements of the open space system. Cemeteries, with their landscaped, park-like settings are part of the open space network within an urban environment. The campuses of private and public academic institutions, churches and hospitals contribute in some degree to the urban open space network.<sup>241, 2002</sup>

### ***Existing Problems, Issues and Opportunities***

No information was discovered regarding existing problems, issues and opportunities for forestry and green space.

### ***Future and Planned Usage***

The *Koolau Poko Sustainable Communities Plan* states that the open space will be used to:

- Protect scenic beauty and scenic views and provide recreation;
- Promote access to shoreline and mountain areas;
- Define the boundaries of communities;
- Prevent urban sprawl;
- Provide buffers between agricultural uses and residential neighborhoods;
- Create a system of linear greenways along roadways and drainage channels; and
- Prevent development in areas susceptible to landslides and similar hazards<sup>66, 2000</sup>

The *General Plan: City and County of Honolulu* seeks to retain the North Shore's unique qualities and rural character in meeting community needs, emphasizing retention of the region's scenic open spaces, coastal resources, and elements of the community's cultural and plantation heritage.

Trails in the forestry areas require active management by the State Land and Natural Resources. Forestry and green space areas are for protection of the scenic characteristic of the area.<sup>28, 1992</sup>

## ***Future and Planned Requirements or Changes***

The *General Plan: City and County of Honolulu* list the following planned changes for open space and natural environment policies, principles, and guidelines:

- Incorporate the land use concept and natural resource management principles of “Ahupuaa” into land use and management guidelines to protect and enhance the resources of the region.
- Protect ecologically sensitive areas with provisions for protective buffer zones and setbacks.
- Protect scenic views, preserve open space, and minimize the impacts of new developments and utility improvements on scenic resources.
- Improve accessibility of recreational resources including shoreline and mountain areas.
- Direct new developments to areas within or next to existing developments within the Rural Community Boundary.
- Conduct planning with attention to preservation of natural open space, protecting coastal and mauka views from public roadways, and conserving important viewsheds.
- Evaluate the impact of land use proposals on the visual quality of the landscape, including viewplane and open space considerations.
- Encourage interagency and private sector participation and cooperation in the creation, maintenance and enhancement of views and visual resources on the North Shore.<sup>28, 1992</sup>

The *Koolau Poko Sustainable Communities Plan* discusses the following changes:

- Provide Passive and Active Open spaces – Active areas include community-based parks, golf courses, cemeteries and intensive agricultural uses. Passive areas include lands in the State Conservation District, drainage and utility corridors, nature parks, preserves and wetlands, and agricultural lands such as pastures, aquaculture ponds and fallow fields. Beach parks may be either active or passive, depending upon the extent to which they have been improved.
- Promote Accessibility of Recreational Open Space – Public parks and most golf courses will be accessible for public recreational use, but the open system should also promote the accessibility of shoreline and mountain areas (as required by City ordinance and State law).
- Enhance the Visual and Physical Definition of Urban Area – Koolau Poko’s residential communities are physically defined by topographic features; major water bodies, including wetlands; and agricultural areas. Other forms of open space and landscaping, however, should be used to visually enhance the separation between communities, particularly where topographic features are less pronounced.<sup>66, 2000</sup>

The *Primary Urban Center General Development Plan* notes future requirements as follows:

- Maintain significant trees and landscaped open space within institutional campuses, cemeteries, and other open-space uses that are visible from public rights-of-way.
- Enhance the entries to and street frontages of cemeteries and campuses with trees and landscaping.
- Promote the development of plazas to fulfill park and open space requirements.<sup>241, 2002</sup>

### ***Anticipated Costs for the Future***

No information was discovered regarding anticipated costs for the future for forestry and green space.

### ***Problems, Issues and Opportunities Associated with Costs***

No information was discovered regarding problems, issues and opportunities associated with costs for forestry and green space.

### ***Compare Visitor and Resident Impact***

No information was discovered regarding the comparison of visitor and resident impact for forestry and green space.

### ***Major Assumptions***

No information was discovered regarding major assumptions for forestry and green space.

## City and County of Honolulu – Air Quality

### ***Present Capacity and Usage***

This parameter is not wholly conducive to measuring air quality.

The *Annual Summary Hawaii Air Quality Data: 2000* lists the air quality monitoring stations on Oahu. The Department of Health has 17 air quality monitoring stations on Oahu, Kauai, Maui, and Hawaii. Most commercial, industrial and transportation activities and their associated air quality effects occur on Oahu where nine of the stations are located.

One of Oahu's nine air quality-monitoring stations that is located in Koolau Poko. Located within the Waimanalo Sewage Treatment Facility, at 41-1069 Kalaniana'ole Highway, this site is in a sparsely populated rural and agricultural community. Waimanalo is on the windward (upwind) side of Oahu approximately ten miles east-northeast of downtown Honolulu. This site was established in June 1971 as a SLAMS site initially for the sampling of TSP before it was changed to PM10 sampling in July 1989. (See Appendix for location of air quality monitoring sites.)

The *Annual Summary Hawaii Air Quality Data: 2000* describes Oahu's nine air quality monitoring stations.

**Honolulu:** Located atop the Department of Health (DOH) building (Kinau Hale), at 1250 Punchbowl Street in downtown Honolulu, this site is in a commercial, institutional, and residential area. The pollutants sampled at this site are PM10, CO, and SO<sub>2</sub>.

**Sand Island:** Located at the Anuenue Fisheries, the area is composed of light industrial, commercial, recreational, and harbor units and is approximately two miles southwest (typically downwind) of downtown Honolulu.

**Pearl City:** Located at top the Leeward Medical Center the area is a combination of commercial and residential units and is approximately nine and a half miles northwest of downtown Honolulu.

**Waimanalo:** Located within the Waimanalo Sewage Treatment Facility this site is in a sparsely populated rural and agricultural community.

**Waikiki:** Located at 2131 Kalakaua Avenue, Waikiki is a busy commercial and residential area with heavy vehicular traffic.

**Makaiwa:** Located at 92-670 Farrington Highway, this site is in a residential and agricultural area approximately 25 miles west of downtown Honolulu. This station is downwind and to the southeast of an electrical power plant.

**West Beach:** Located within the Ko Olina Golf Course, this site is in a recreational, residential, and agricultural area approximately 1.5 miles northwest of Campbell Industrial Park.

**Kapolei:** Located at 91-591 Kalaeloa Boulevard at the entrance to Campbell Industrial Park. This site is in a commercial, industrial, and residential area with nearby agricultural lands.

**Liliha:** Located at Kauluwela Elementary School this site is in a residential and commercial area near the H-1 freeway, approximately one and a quarter miles north of downtown Honolulu.<sup>67, 2000</sup>

The *Analysis of Renewable Portfolio Standard Options for Hawaii* reviewed the State's air quality. Hawaii's air quality meets federal and state environmental health standards because Hawaii's trade winds and the lack of major polluting industries reduce the buildup of air pollution over the islands. Under the Clean Air Act, the United States Environmental Protection Agency set National Ambient Air Quality Standards (NAAQS) for a variety of "criteria pollutants." The State Health Department has set standards that are up to twice as stringent as the EPA criteria for most of the criteria pollutants.<sup>137, 2001</sup>

The *Environmental Report Card 2001* reported historical air quality variables shown in Tables 2.32 and 2.33 below.

**Table 2.34 -- Number of Days Air Quality Declared Unhealthy by EPA Standards, 1989-1998**

|               | Number of Monitoring Sites | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|---------------|----------------------------|------|------|------|------|------|------|------|------|------|------|
| Honolulu      | 6                          | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| Las Vegas     | 6                          | 36   | 21   | 8    | 4    | 6    | 8    | 1    | 5    | 0    | 0    |
| Los Angeles   | 38                         | 215  | 173  | 169  | 175  | 134  | 139  | 113  | 94   | 60   | 56   |
| San Francisco | 9                          | 0    | 0    | 0    | 0    | 0    | 0    | 2    | 0    | 0    | 0    |

Source: *Environmental Report Card 2001*

**Table 2.35: Air Quality Measurements in Honolulu, 1994-2000**

|                                       | 1996 | 1997 | 1998 | 1999 | 2000 | Federal Standard |
|---------------------------------------|------|------|------|------|------|------------------|
| PM <sub>10</sub> (µg/m <sup>3</sup> ) | 14   | 8    | 9    | 14   | 14   | 50               |
| CO (µg/m <sup>3</sup> )               | 2127 | 4133 | 6726 | 4788 | 3990 | 40,000           |
| SO <sub>2</sub> (µg/m <sup>3</sup> )  | 3    | 2    | 2    | 2    | 1    | 80               |

Source: *Environmental Report Card 2001*

### ***Existing Problems, Issues and Opportunities***

Recent passage of county regulations banning smoking in public areas, buildings and restaurants has not had the degree of impact expected. Smoke-free environments, both indoors and outdoors, positively affect the public health.

Another problem is the use of fireworks in some cultural and religious events. A statewide ban would inhibit these events, so regulation of fireworks has been passed to the county level. While Police and Fire departments support banning fireworks, restricting use to designated areas is more likely. <sup>244,2002</sup>

The *Environmental Report Card 2001* states that all metropolitan areas in the United States with populations greater than 200,000 are required to report the air quality to the EPA. <sup>74, 2001</sup>

Reply to Ask An Earth Scientist states that Hawaii has very clean air in general. The abundant wind and rain, plus the relatively low population (even on Oahu, the population density is not considered “high” for the most part) help keep the air clean. Hawaii does have a large automobile density and this contributes to photochemical smog in Honolulu that is noticeable on low wind days. <sup>115, 2001</sup>

According to the World Health Organization continuing population increases around the world and in the City and County of Honolulu have correspondingly increased the numbers of automobiles and trucks as well as the pollutants emitted from these vehicles. <sup>119, 2000</sup>

### ***Future and Planned Usage***

This parameter is not conducive to measuring air quality.

### ***Future and Planned Requirements or Changes***

Indicators of Environmental Quality states that the Department of Health is conducting several special projects including a study of the agricultural practice of burning sugar cane and a study of the impacts of volcanic haze. <sup>114, 2002</sup>

### ***Anticipated Costs for the Future***

Some federal funds are through Honolulu Clean Cities. Over \$125,000 has been granted to date. Additional sources of funding will have to be identified. <sup>244,2002</sup>

### ***Problems, Issues and Opportunities Associated with Costs***

No information was discovered regarding the problems, issues and opportunities associated with costs.

### ***Compare Visitor and Resident Impact***

Waikiki is a more densely populated and used area of the Island of Oahu and therefore may have more air quality issues.

### ***Major Assumptions***

No information was discovered regarding major assumptions.

## City and County of Honolulu – Beach Erosion

### ***Present Capacity and Usage***

The Present Capacity and Usage parameter is not conducive to measuring Beach Erosion.

### ***Existing Problems, Issues and Opportunities***

The Hawaii Coastal Erosion Management Plan describes beach erosion on the Island of Oahu.

- 10.7 miles of beach has been narrowed by shoreline hardening
- 6.4 miles of beach has been lost of around 24% of the 71.6 miles of originally sandy shoreline on Oahu
- City and County of Honolulu increased setback for new construction from 40 feet to 60 feet<sup>103, 2000</sup>

The *Annual Report to the Twenty-First Legislature Regular Session 2002 Hawaii Coastal Zone Management* reports the County received a total of twenty-eight (28) SMA major permits and sixty-seven (67) SMA minor permits. The County approved with conditions eleven (11) SMA major permits and sixty-three (63) SMA minor permits. The County reported twenty-five (25) SMA permit and SSV violations. Three (3) of the violations were resolved and twenty-two (22) are pending.<sup>61, 2001</sup>

The *General Plan: City and County of Honolulu* found that on Oahu 10.7 miles of beach has been narrowed by shoreline hardening and 6.4 miles has been lost. This is approximately 24% of the 71.6 miles of originally sandy shoreline on Oahu.<sup>28, 1992</sup>

**Table 2.36 -- Beach Narrowing and Loss on Oahu: 1992**

|   | Mokuleia     | Kaaawa     | Kailua-Waimanalo | Mali-Makaha  | Island wide    |
|---|--------------|------------|------------------|--------------|----------------|
| Range of shoreline change rates for armored sites (m/y) | -0.1 to -0.3 | 0 to - 1.7 | 0.2 to -1.8      | -0.2 to -1.0 | Not calculated |

Source: *General Plan: City and County of Honolulu*

The *Annual Report to the Twenty-First Legislature Regular Session 2002* states that the County continues ongoing efforts to increase compliance with coastal zone management laws and regulations and to improve their administration and enforcement by:

- Improving administration of land use regulations and control via improved internal coordination, including the tracking and monitoring of previous approvals, pending applications, outstanding violations, and site

- investigations, through the establishment and refinement of our comprehensive computer network system.
- Enabling professional engineers and inspectors to better implement the revised Rules Relating to Storm Drainage Standards and Soil Erosion Standards and Guidelines by providing improved training and continued education.
  - The County facilitates public access to information on land use regulations, pending permit applications, and upcoming public hearings, by providing information through the County's Internet web site.
  - Interactive map and land use information was made available via the deployment of a GIS Internet web site, which is available to the public free of charge. <sup>61, 2001</sup>

### ***Future and Planned Usage***

The Future and Planned Usage parameter is not conducive to measuring Beach Erosion.

### ***Future and Planned Requirements or Changes***

The *Annual Report to the Twenty-First Legislature Regular Session 2002* states that the County will continue to work with the coastal erosion subcommittee. Ongoing regulatory activities, including SMA permit processing and monitoring, investigation and enforcement of shoreline violations, and review of environmental documents will continue. The County will monitor the State Legislature for opportunities to participate in the discussion of coastal issues and to support legislative proposals to improve and/or streamline regulations related to coastal resources. Applicants have been required to prepare water quality reports for all significant new developments to ensure that water quality standards are met. <sup>61, 2001</sup>

### ***Anticipated Costs for the Future***

The *Hawaii Coastal Erosion Management Plan* anticipates future costs to include acquiring the Ka Iwa shoreline on the south coast of Oahu for approximately \$10 million. <sup>103, 2000</sup>

The *Annual Report to the Twenty-First Legislature Regular Session 2002* states Coastal Zone Management funded four (4) full-time planners. Two (2) planners were assigned permit review responsibilities and two were dedicated to monitoring and enforcement. <sup>61, 2001</sup>

The Six-Year CIP and Budget FY2003-2008 appropriates for fiscal year 2002-2003 \$380,000 for a coastal erosion mapping project. <sup>245, 2002</sup>

### ***Problems, Issues and Opportunities Associated with Costs***

The *Hawaii Coastal Erosion Management Plan* reports that the City and County of Honolulu budgeted \$12.5 million for coastal land purchases in FY'98. <sup>103, 2000</sup>

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### ***Compare Visitor and Resident Impact***

The *Hawaii Coastal Erosion Management Plan* states that tourism in the state is closely tied to the quality of Hawaiian beaches. As visitors find access difficult to shorelines lined by seawalls and crowded with development, they will come to realize that Hawaii's beaches are degraded, that coastal vistas are no longer pristine, and that fulfilling opportunities to experience the Hawaiian shore depicted by the visitor industry are rare. <sup>103, 2000</sup>

### ***Major Assumptions***

The *Hawaii Coastal Erosion Management Plan* makes the following assumptions:

- Beach loss seriously impacts the visitor economy in Hawaii.
- Public access to beaches and the ocean is a right that is preserved by the State of Hawaii constitution.
- Beach loss and narrowing, and coastal dune grading that accompanies coastal development causes environmental and ecological damage to natural resources and habitats.
- Coastal hardening can produce coastal water quality impacts through increased turbulence and turbidity, and the direct flow of domestic sewage products into coastal waters because of the prevalence of sewage soil filtration (septic and cesspool systems) on shoreline plots. <sup>103, 2000</sup>

## City and County of Honolulu – Invasive Species

### ***Present Capacity and Usage***

The Present Capacity and Usage parameter is not conducive to measuring Beach Erosion.

### ***Existing Problems, Issues and Opportunities***

The *Impact on Alien Plants on Hawaii's Native Biota* reports that there are over 4,600 alien species in Hawaii, of which over 600 have become naturalized. Eighty-six are considered pests in areas not cultivated or urbanized and of the 28 species that appear to be a problem on only one island 3 species (11%) occur on Oahu.

Oahu does not have the highest number of problem weeds, however it is the principal port of entry for the Islands and could be the most probable area where weeds would become established.

Three species of 'Caribbean' frogs have been spreading throughout Oahu, Maui, and the Big Island. *Eleutherodactylus coqui*, *E. martinicensis*, and *E. planirostris* are tiny frogs with huge appetites. Studies conducted indicate that an infested acre (8,100 frogs) could consume as many as 46,000 prey items every night. Native plants that depend on pollination from particular insects are indirectly affected, and a disruption to the food chain could impact our rare forest birds.<sup>134, 1998</sup>

The *Annual Report to the Twenty-First Legislature 2001 Regular Session* states that incipient *Miconia* populations have been cleared from Oahu.<sup>99, 2002</sup>

The *Annual Report to the Twenty-First Legislature 2001 Regular Session* reported on the Oahu Invasive Species Committee (OISC). OISC hired a field tech in late 2000, who reported the following progress:

- *Miconia* – 10 sites surveyed or treated, 76 days, ~140 plants killed
- Fountain grass – 4 sites treated, 23 days, >500 clumps treated
- *Hiptage* – 3 sites treated, 14 days >40 plants removed.<sup>58, 2001</sup>

### ***Future and Planned Usage***

No information was uncovered regarding future and planned usage.

### ***Future and Planned Requirements or Changes***

No information was uncovered regarding future and planned requirements or changes.

### ***Anticipated Costs for the Future***

No information was uncovered regarding anticipated costs for the future.

### ***Problems, Issues and Opportunities Associated with Costs***

No information was uncovered regarding problems, issues and opportunities associated with costs.

### ***Compare Visitor and Resident Impact***

Both visitors and residents traveling to and from the Hawaiian Islands share in the potential risk of transplanting invasive plants, animals and insects.

### ***Major Assumptions***

No information was uncovered regarding the major assumptions.

## City and County of Honolulu – Other Natural / Scenic Resources - Native Extinction

### ***Present Capacity and Usage***

The Nature Conservancy's report *Places We Protect – Watershed Partnerships and Preserves* describes two nature preserves that protect Hawaii's rare flora and fauna.

#### **Honouliuli**

Located on the southeast slope of the Waianae Mountain Preserve (3,692 acres) is home to nearly 70 rare plant and animal species. Leased from the Estate of James Campbell, Honouliuli protects several Hawaiian plants and a native land snail, which are found nowhere else on Earth. Its boundaries contain one of the last remaining habitats of native forest birds and for the Hawaiian owl (pueo). Honeycreepers also inhabit the forest of Honouliuli: the feathered 'apapane and the yellow 'amkihi.

#### **Ihiihilauakea Preserve**

Located in an extinct crater on Oahu's southeast end lies a 30-acre Conservancy preserve that in extreme wet conditions transforms into an emerald pool of a rare native fern known as *Marsilea Villosa*, or ihiihi. In 1987, after surveys revealed that this crater was habitat for the *Marsilea Villosa* and possibly the largest population of the fern in the state, the Conservancy, the City and County of Honolulu, and the Hawaiian Botanical Society moved to protect the area. The rare aquatic *Marsilea Villosa* fern lies dormant during Hawaii's dry months, however, when the wet, winter months arrive and Ihiihilauakea Crater fills with a temporary pool of water, the rare *Marsilea* comes to life, its emerald green fronds resemble that of a four-leaf clover.<sup>149, 2002</sup>

The *Hawaii's Endangered Species* describes that the Oahu Elepaio, a once very common bird, has disappeared from 96% of its historic range.<sup>146, 2002</sup>

### ***Existing Problems, Issues and Opportunities***

The *Hawaii's Endangered Species* states that the Oahu Elepaio is currently distributed in a series of small isolated populations, and is at risk of extinction due to predators and diseases.<sup>146, 2002</sup>

### ***Future and Planned Usage***

The *Hawaii's Endangered Species* goal is to continue current efforts to restore existing populations, identify and restore additional suitable habitat, and continue the technology development program for captive propagation/release using Hawaii Elepaio as surrogate species in the event a restoration program for Oahu Elepaio is required in the future. Current partnership efforts are focused on the

restoration and management of suitable habitat, and monitoring existing populations.<sup>146, 2002</sup>

### ***Future and Planned Requirements or Changes***

Future requirements for the Oahu Elepaio enumerated by the *Hawaii's Endangered Species* are:

- Continue predator control and monitoring of demography, disease prevalence, and effectiveness of management efforts in existing populations in southeastern Oahu.
- Collaborate with The Nature Conservancy of Hawaii to continue management and monitoring of the Elepaio population in Honouliuli Preserve.
- Collaborate with the U.S. Army Environmental staff to continue predator control and monitoring of Elepaio populations in Schofield Barracks West Range and Makua Valley Military Reservation.
- Collaborate with University of Hawaii researchers to determine genetic structure of isolated subpopulations, develop molecular methods for the detection avian poxvirus, and identify disease-resistant individuals.
- Complete island-wide surveys to determine the current distribution and abundance of Oahu Elepaio.
- Identify and restore additional suitable habitat.
- No current plans for captive breeding of this species. Continue working with Big Island subspecies to develop surrogate propagation technology.<sup>146, 2002</sup>

### ***Anticipated Costs for the Future***

No information was discovered regarding anticipated costs for the future.

### ***Problems, Issues and Opportunities Associated with Costs***

No information was discovered regarding problems, issues and opportunities associated with costs.

### ***Compare Visitor and Resident Impact***

See Hawaii State Native Extinction Summary information.

### ***Major Assumptions***

No information was discovered regarding major assumptions.

## **City and County of Honolulu – Primary Urban Center – Water Quality and Quantity**

### ***Present Capacity and Usage***

The *Primary Urban Center General Development Plan* (PUC) describes that the Board of Water is responsible for the municipal water system in the entire PUC. The East and Central sections of the PUC overlie the Honolulu aquifer. The western PUC overlies the Pearl Harbor aquifer, the largest supplier of groundwater on Oahu and the source of most of the PUC's municipal supply.

The Board of Water Supply estimates demand for water within the PUC at 190 gallons per capita per day. Present average daily demand is about **85 million gallons per day** (MGD).<sup>241, 2002</sup>

### ***Existing Problems, Issues and Opportunities***

The *Primary Urban Center General Development Plan* notes that the Honolulu and Pearl Harbor aquifers are under the State Commission on Water Resources Management because waters are threatened by existing or proposed withdrawals or diversions.<sup>241, 2002</sup>

### ***Future and Planned Usage***

The *Primary Urban Center General Development Plan* states projected population growth of 29,000 to 88,000 people will result in an additional demand of **7.4 to 16.7mgd**.

The Board of Water Supply is planning to meet additional water demands in the PUC by developing new sources in Waipahu, Waiawa and Windward Oahu, and constructing new trunk lines in central Honolulu.<sup>241, 2002</sup>

### ***Future and Planned Requirements or Changes***

The *Primary Urban Center General Development Plan* states that expanding the capacity of water supply is a necessary future policy.<sup>241, 2002</sup>

### ***Anticipated Costs for the Future***

See City and County of Honolulu Water Summary for information.

### ***Problems, Issues and Opportunities Associated with Costs***

The *Primary Urban Center General Development Plan* notes that in Kakaako, the State government has established a special redevelopment district and has invested over \$125 million in upgrading, street, water, sewer, drainage, and utility infrastructure.

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To remedy district- or neighborhood-scale infrastructure constraints is beyond the capacity of individual landowners. Likewise, paying for relief lines and larger-scale projects that will benefit multiple landowners requires government leadership in providing long-term financing and apportioning costs. <sup>241, 2002</sup>

***Compare Visitor and Resident Impact***

See City and County of Honolulu Water Summary for information.

***Major Assumptions***

See City and County of Honolulu Introduction and Water Summaries for information.

## **City and County of Honolulu – Primary Urban Center – Sewage**

### ***Present Capacity and Usage***

The *Primary Urban Center General Development Plan* (PUC) describes the PUC's wastewater system as follows. The City's Department of Environmental Services manages the municipal wastewater collection, treatment and disposal system and provides almost complete service coverage for the PUC through the Mamala Bay Sewerage District whose outflows are processed through the Sand Island Wastewater Treatment Plant. The western portion of the PUC, from Halawa through Pearl City, is within the West Mamala Bay service area, whose outflows are processed through the Honouliuli Wastewater Treatment Plant.<sup>241, 2002</sup>

### ***Existing Problems, Issues and Opportunities***

The PUC's aging collection system is recognized as a major obstacle to the orderly development of the city. In some areas of the East Mamala subdistrict the age of sewer lines approaches 100 years old. New development is restricted due to inadequate sewer capacity.<sup>241, 2002</sup>

### ***Future and Planned Usage***

The *Primary Urban Center General Development Plan* recommends the expansion of sewage capacity as a future policy.<sup>241, 2002</sup>

### ***Future and Planned Requirements or Changes***

The *Primary Urban Center General Development Plan* lists two proposed future changes:

- Complete current projects needed to correct service and facility inadequacies to neighborhoods where change in service demand is not anticipated.
- Implement the recommendations of the East and West Mamala Bay Wastewater Facilities Plans to upgrade treatment and collection systems.<sup>241, 2002</sup>

### ***Anticipated Costs for the Future***

See City and County of Honolulu Sewage Summary for information.

### ***Problems, Issues and Opportunities Associated with Costs***

The *Primary Urban Center General Development Plan* states that current wastewater policy requires new developments to pay for correcting existing system deficiencies, in addition to improvements directly related to the project. High costs for offsite wastewater facilities may make development economically infeasible.<sup>241, 2002</sup>

### ***Compare Visitor and Resident Impact***

See City and County of Honolulu Sewage Summary for information.

### ***Major Assumptions***

See City and County of Honolulu Introduction and Sewage Summaries for information.

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## **City and County of Honolulu – Primary Urban Center – Solid Waste Disposal**

### ***Present Capacity and Usage***

There are no sanitary landfills within the Primary Urban Center.

### ***Existing Problems, Issues and Opportunities***

See City and County of Honolulu Solid Waste Summary for information.

### ***Future and Planned Usage***

The *Primary Urban Center General Plan* plans a reduction in solid waste by encouraging recycling and reuse.<sup>241, 2002</sup>

### ***Future and Planned Requirements or Changes***

The *Primary Urban Center General Plan* lists three future changes.

- Promote waste recycling by providing expanded collection facilities and services, and public outreach and education programs.
- Expand the use of automated refuse collection in residential areas.
- In planning new public facilities, include neighborhood recycling convenience centers where feasible.<sup>241, 2002</sup>

### ***Anticipated Costs for the Future***

No information was uncovered regarding anticipated costs for the future.

### ***Problems, Issues and Opportunities Associated with Costs***

No information was uncovered regarding problems, issues and opportunities associated with costs.

### ***Compare Visitor and Resident Impact***

No information was uncovered regarding the comparison of visitor and resident impact.

### ***Major Assumptions***

No information was uncovered regarding major assumptions.

## **City and County of Honolulu – Primary Urban Center – Storm Water**

### ***Present Capacity and Usage***

The *Primary Urban Center General Development Plan* (PUC) describes the upland areas of the PUC are drained via natural drainageways and streams, which empty into Mamala Bay. In the east and central sections, Moanalua Stream and Kalihi Stream flow into Keehi Lagoon; Kapalama Canal and Nuuanu Stream empty into Honolulu Harbor; and the Manoa, Palolo and Makiki Streams drain to Mamala Bay via the Ala Wai Canal. In the western end of the PUC, the major drainageways are Waiawa, Waimalu and Halawa Streams, which flow into the East Loch of Pearl Harbor. The lower reaches of most of these streams have been channelized to facilitate rapid transport and disposal of runoff from urban areas.<sup>241, 2002</sup>

### ***Existing Problems, Issues and Opportunities***

The *Primary Urban Center Development Plan* explains that incremental build-out of hillsides and lower valley slopes can also affect drainage systems, both natural and urbanized. Increased lot coverage by larger buildings and more extensive paving has increased the volume and rate of storm water discharge causing flood conditions in some areas. This problem is exacerbated in the mauka reaches of the valleys and hillsides, where rainfall is higher.

The control and management of urban watersheds and protection of its coastal water quality are the leading storm water management issues in the PUC.<sup>241, 2002</sup>

The Surfrider Foundation reports that sediment from streams and storm water channels has filled the Ala Wai Canal in Honolulu. This sediment contains contaminants from pesticides, vehicular sources, plastics, and other litter, all of which travel through the watershed and wash into storm drains.

The Department of Health has performed a series of inorganic substance level tests over the years on fish caught in the canal. Reports from these tests indicate that one fish caught in the canal had enough contamination to be carcinogenic.<sup>168, 2000</sup>

### ***Future and Planned Usage***

The *Primary Urban Center Development Plan* states expanding the capacity of storm water management as a future policy. Methods of retaining and detaining storm water for gradual release into the ground are the preferred strategy for the management of storm water.<sup>241, 2002</sup>

The Oahu Chapter of Surfrider Foundation has worked with organizations to install filters on storm drains to prevent metals, hydrocarbon and plastic from

entering the canal. The first filter was installed on Ali Wai Blvd and test data indicates that the filter removed significant quantities of heavy metals.<sup>168, 2000</sup>

### ***Future and Planned Requirements or Changes***

The *Primary Urban Center Development Plan* states that hillside lands should be placed in preservation or low-density residential zoning districts to prevent inappropriate development.

Drainage channels are to be selectively modified to introduce more natural elements, such as streamside trees, rip-rap lining and v-notched or unlined channel bottoms.<sup>241, 2002</sup>

### ***Anticipated Costs for the Future***

See City and County of Honolulu Storm Water Summary for more information.

### ***Problems, Issues and Opportunities Associated with Costs***

See City and County of Honolulu Storm Water and Primary Urban Center Water Summaries for additional information.

### ***Compare Visitor and Resident Impact***

See City and County of Honolulu Storm Water and Primary Urban Center Water Summaries for additional information.

### ***Major Assumptions***

See City and County of Honolulu Introduction and Storm Water and Primary Urban Center Water Summaries for additional information.

## City and County of Honolulu – Primary Urban Center – Roads

### ***Present Capacity and Usage***

The *Primary Urban Center General Development Plan* (PUC) describes the roadways. Honolulu adopted public works standards in the late 1960s that sized and configured roads to enhance the flow of automobile traffic. The road standards applied to residential subdivisions were based on highway design featuring wide travel lanes and broad curve radiuses.

More recent initiatives to improve traffic flow include adjustment to traffic signals, modifications to intersections, and conversion of parking lanes to traffic lanes.<sup>241, 2002</sup>

While the State of Hawaii Department of Transportation collects traffic information for State roads, the County does not. As there is no executive summary for the information, further research is required to adequately evaluate this data.

There was little information regarding number of visitors to the individual parks, zoos and attractions. Most information was collective in nature, like the number of acres for all the county parks on Oahu. According to the *2001 State of Hawaii Data Book*, there were 500,000 visitors to the Honolulu Zoo and 1,000,000 visitors to Diamond Head.

### ***Existing Problems, Issues and Opportunities***

The *Primary Urban Center General Development Plan* notes that the public works standards created two results:

- New subdivisions were built with overly-wide roadways that encourage speeding and detract from the sense of community.
- Many older roads were rated “substandard.”
- Widening and conversion of key streets to one-way arterials has resulted in reduced sidewalk widths, reduced on-street parking, and reduced pedestrian activity.
- There is a need for a bypass highway that would serve Sand Island and the Nimitz industrial corridor and route Waikiki-bound through traffic away from Downtown.
- Proposals to “double-deck” the H1 Freeway and Nimitz Highway have encountered strong political opposition and have been shelved.
- Many major roadways – including collector streets as well as highways – are inhospitable to bicyclists and pedestrian crossings.
- Kamehameha Highway in the Pearl City-Aiea area cuts most of the residential community off from the Pearl Harbor waterfront.

- The multi-lane Nimitz Highway isolates the Downtown area from the Honolulu waterfront.<sup>241, 2002</sup>

### ***Future and Planned Usage***

The *Primary Urban Center General Development Plan* states providing wide sidewalks and trees for shade and by encouraging property owners to build to the sidewalk edge will enliven commercial streets.<sup>241, 2002</sup>

### ***Future and Planned Requirements or Changes***

The *Primary Urban Center General Development Plan* proposes traffic be rerouted to a new Sand Island parkway and harbor tunnel thoroughfare and replace the makai portion of Nimitz Highway with a new shoreline pedestrian promenade and mixed-use commercial/recreational/residential complexes.

Undertake a comprehensive review of the City's street widening plans and reevaluate the use of Ordinance No. 2412 on streets that the City does not intend to commit funds for street widening. Eliminate travel-way widenings that are not necessary.<sup>241, 2002</sup>

### ***Anticipated Costs for the Future***

The *Primary Urban Center General Development Plan* states that reconstructing older rights-of-way to current public works standards would be prohibitively expensive, in many instances, requiring the taking of private residential lots and dwellings.

Hundreds of millions of dollars are spent each year by the State and the City to operate and maintain Oahu's roadways (\$17.9 billion projected between 1995 and 2020).<sup>241, 2002</sup>

### ***Problems, Issues and Opportunities Associated with Costs***

The *Primary Urban Center General Development Plan* notes that acquisition of right-of-way to build new or widen existing thoroughfares is severely constrained by high costs and limited space.<sup>241, 2002</sup>

### ***Compare Visitor and Resident Impact***

The *Primary Urban Center General Development Plan* proposal to build a new Sand Island parkway and harbor tunnel thoroughfare will reroute Airport-to-Waikiki past this unsightly industrial section.<sup>241, 2002</sup>

### ***Major Assumptions***

See City and County of Honolulu Roads Summary for information.

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## **City and County of Honolulu – Primary Urban Center – Airports**

### ***Present Capacity and Usage***

As Honolulu International Airport is the major airport in City and County of Honolulu, the majority of the City and County of Honolulu Airport Summary refers to it. Please refer to the City and County of Honolulu Airport Summary for information pertaining to Honolulu International Airport and State of Hawaii Airports summary for general information.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

## City and County of Honolulu – Primary Urban Center – Harbors

### ***Present Capacity and Usage***

The *2001 State of Hawaii Data Book* lists the activity level for passengers and cargo at Honolulu Harbor.

**Table 2.37 -- Overseas and Inter-island Passengers Arrivals and Departures**

| Type of passenger   | 1996   | 1997   | 1998   | 1999   | 2000   | 2001   |
|---------------------|--------|--------|--------|--------|--------|--------|
| <b>Overseas:</b>    |        |        |        |        |        |        |
| In                  | 14,851 | 18,262 | 25,570 | 45,494 | 31,767 | 48,429 |
| Out                 | 16,128 | 17,527 | 28,932 | 44,389 | 31,845 | 46,922 |
| <b>Interisland:</b> |        |        |        |        |        |        |
| In                  | 44,982 | 46,825 | 43,522 | 47,950 | 52,570 | 47,870 |
| Out                 | 45,159 | 40,558 | 43,754 | 47,782 | 52,883 | 71,816 |

Source: *2001 State of Hawaii Data Book*

**Table 2.38 -- Ship Arrivals and Cargo Tonnage**

| Year | Overseas Vessels |               | Interisland Vessels |               |
|------|------------------|---------------|---------------------|---------------|
|      | Number           | Cargo Tonnage | Number              | Cargo Tonnage |
| 1984 | 1,686            | 4,870,182     | 2,660               | 2,369,863     |
| 1985 | 1,749            | 5,071,250     | 2,412               | 1,884,925     |
| 1986 | 1,825            | 5,379,135     | 2,697               | 2,121,858     |
| 1987 | 2,080            | 5,736,005     | 2,848               | 2,135,235     |
| 1988 | 2,014            | 6,586,749     | 3,172               | 2,746,776     |
| 1989 | 2,024            | 6,877,963     | 3,101               | 2,892,709     |
| 1990 | 2,159            | 7,439,568     | 3,212               | 2,917,984     |
| 1991 | 2,066            | 6,939,735     | 3,190               | 3,962,085     |
| 1992 | 2,104            | 8,235,947     | 3,207               | 3,101,050     |
| 1993 | 1,918            | 7,462,619     | 2,440               | 2,731,645     |
| 1994 | 1,603            | 6,434,257     | 2,737               | 2,372,971     |
| 1995 | 1,790            | 6,064,842     | 2,996               | 2,096,597     |
| 1996 | 1,650            | 6,150,398     | 2,831               | 2,349,354     |
| 1997 | 1,604            | 6,244,158     | 2,679               | 2,312,266     |
| 1998 | 1,320            | 6,732,716     | 4,309               | 1,765,496     |
| 1999 | 1,262            | 5,721,503     | 2,249               | 1,730,662     |
| 2000 | 1,292            | 7,561,828     | 2,215               | 1,872,440     |
| 2001 | 1,744            | 7,768,135     | 2,280               | 1,862,353     |

Source: *2001 State of Hawaii Data Book*

The Primary Urban Center (PUC) General Development Plan states that due to new efficiencies in retailing and shipping, the demand for warehousing near Honolulu Harbor has decreased.<sup>241, 2002</sup>

### ***Existing Problems, Issues and Opportunities***

The *Primary Urban Center General Development Plan* notes that there are opportunities for waterfront renewal around both Honolulu Harbor and Pearl Harbor.

The Diamond Head portion of the Harbor, between Piers 1 and 15, has been expanded to support both recreational and commercial uses as well as maritime passenger travel.

Opportunities exist to support attractions that are of interest to both residents and visitors include State-sponsored waterfront commercial and cultural attractions around the Kewalo Basin Area.<sup>241, 2002</sup>

### ***Future and Planned Usage***

The *Primary Urban Center General Development Plan* notes that the State of Hawaii master plan envisions the development of Keehi Lagoon and its shoreline, including portions of Airport land, for recreational small-boat marinas. The development of a commercial “fishing village” at Pier 38 is also proposed.

Commercial maritime activity is planned for both Ala Wai Boat Harbor and Keehi Lagoon. At Ala Wai, the “front row” is targeted for off-shore activity boats. At Keehi, plans call for two marinas for recreational vessels, commercial fishing boats and mega-yachts, as well as other berths for commercial fishing boats and oil spill response vessels.<sup>241, 2002</sup>

### ***Future and Planned Requirements or Changes***

The *Primary Urban Center General Development Plan* suggests the enhancement of Honolulu Harbor and harbor-related uses. It further recommends reserving areas around Honolulu Harbor, particularly around Kapalama Basin and the Sand Island container yard, for future harbor-related uses.<sup>241, 2002</sup>

State Airports, Harbors and Highways lists future changes as follows:

#### Honolulu Harbor

A major project design is the Pier 2 Cruise Ship Terminal.

Finger piers in the area of Piers 12-18 for the larger domestic commercial fishing boats.

Lay berths in Keehi Lagoon along Lagoon Drive for commercial fishing boats, barges and other vessels, including provision of water, electricity and security fencing.

Dredging an access channel across Keehi Lagoon “triangle” and dredging Seaplane Lane 8-26 to a depth of –25 feet.

Five cruise ship berths at Piers 2 (2 berths), 9, 10-11 and 19-20.

Piers 28-29 are added to the existing bunker berths along Piers 31-34.

Dredge Kalihi Channel to a width of 500 feet and a depth of –45 feet, including rounding of corners and dredging of a turning basin.

Dredge KMR to 100 feet inland.

A continuous marginal wharf needs to be constructed and dredged at Pier 23.

Additional bunkering facilities at Piers 28 and 29.

Acquisition of Dishowa property is recommended to allow its development for commercial harbor use and incorporation into the inter-island cargo terminals at Piers 39-40.

The Excursion Vessel Passenger Terminal is proposed at Piers 26-27 and Piers 5-7.

A submarine maintenance facility is planned at Pier 15.

Pier 36 as a site for the Domestic Fishing Village, which consolidates fish auction, fish processing, ice house and fueling operations.

Combine the Inter-Island Ferry Terminal with the Excursion Vessel Terminal at Piers 26-27.

A Maritime Office Building in the cruise vessel terminal at Piers 10-11.

Piers 19-20, 23-25, and 31-35 are suggested as potential sites for the Multi-Purpose Storage Area.

One-Stop-Shop in a commercial development in the northeast corner of Fort Armstrong, separated from the container yard by an extension of Ilalo Street connecting to South and Punchbowl streets.

Develop a freight-forwarding facility in the Keehi Industrial Park Association area. Relocate the University of Hawaii marine research programs from Snug Harbor to Pier 38.

Provide office space for tugboat operations on a section of Pier 24.

## **Kewalo Basin**

**Jetties and channel dredging.**<sup>37, 2001</sup>

### ***Anticipated Costs for the Future***

*State Airports, Harbors and Highways* anticipated future costs are as follows:

- Honolulu Harbor
- Construction of the Domestic Fishing Village Pier Improvements \$10.4 million.
- Demolition and removal of existing tank farm near Pier 32 \$626,000.
- Special maintenance projects \$3.1 million.
- Construction of the Domestic Fishing Commercial Fishing Village Multi User Building at Pier 36-38 \$3.3 million.
- Pier 19 terminal improvements \$5.2 million.
- Kewalo Basin
- Special maintenance projects \$172,000.<sup>37, 2001</sup>

### ***Problems, Issues and Opportunities Associated with Costs***

See City and County of Honolulu Harbors Summary for information.

### ***Compare Visitor and Resident Impact***

See City and County of Honolulu Harbors Summary for information.

### ***Major Assumptions***

See City and County of Honolulu Harbors Summary for information.

## **City and County of Honolulu – Primary Urban Center – Parks**

### ***Present Capacity and Usage***

The *Primary Urban Center General Development Plan* (PUC) describes State maintained lookouts at the summits of Nuuanu Pali and Puu Ualaka'a for enjoying scenic vistas toward the shoreline. Most State park facilities have picnic areas, potable water and public restrooms, but overnight camping is not permitted.

All of the community-based parks are maintained, if not owned in fee, by the City and County of Honolulu. Many of the islandwide and regional facilities are under State or military jurisdiction or are privately owned. <sup>241, 2002</sup>

State Parks of the Island of Oahu describes the state operated recreational facilities in the Primary Urban Center.

#### **Aiea Bay State Recreation Area**

Near Aloha Stadium the park offers picnicking opportunities along the banks of Pearl Harbor's East Loch. The Pearl Harbor bike path passes through the park.

#### **Diamond Head State Monument**

Hawaii's most famous landmark—a large tuff cone is a National Natural Landmark. The park offers a moderate family hike and picnicking on the crater floor in landscaped meadow. 475 acres

#### **Kakaako Waterfront Park**

Waterfront park with shore fishing and ocean access for body surfing. Built over a former municipal landfill, the park offers a waterfront promenade, picnic areas, an amphitheater, and observation areas with fine views of Waikiki and Diamond Head. 35 acres

#### **Keiwa Heiau State Recreation Area**

The recreation facility provides picnicking, camping and family hiking in a forested area with rustic facilities. Remains of heiau and specimens of medicinal plants are on display. 384.5 acres.

#### **Kewalo Basin**

Ocean park near downtown Honolulu with a pedestrian promenade, trellised picnic areas, and outdoor showers.

#### **Nuuanu Pali State Wayside**

Impressive view of windward Oahu from brink of Pali cliffs at 1200 feet elevation, Koolau Ra Winds are usually so strong that one can lean against the wall of wind. 3 acres

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### **Puu Ualakaa State Wayside**

The wayside provides a forested area on a cinder cone close to downtown Honolulu. Lookout provides sweeping view of southern Oahu from Diamond Head to Pearl Harbor, including Honolulu and Manoa Valley. Trailhead for Ualakaa Loop Trail (1 mile loop). 50 acres

### **Royal Mausoleum State Monument**

The mausoleum is a burial place of Hawaiian royalty—members of the Kamehameha and Kalakaua Dynasties with the retainers. Guided tours are provided with advance reservations. 10 acres<sup>131, 2002</sup>

### **Waahila Ridge State Recreation Area**

Wild land picnicking on a Norfolk Island pine forested ridge. The facility provides breath-taking views of Manoa and Palolo valleys and family hiking in the forest reserve. 49.9 acres

The Department of Parks and Recreation describes the Foster Botanical Gardens in the Primary Urban Center as the only Honolulu Botanical Gardens with an admission fee. Total revenues were \$119,517 in 2000, an increase of 12 percent from the \$107,047 collected the previous year. Total visitors were 48,434. Revenues for annual passes were \$3,425, a 2 percent decrease from the previous year. A total of 40 wedding ceremonies with 844 attendees and another 28 wedding photographic sessions involving 436 participants took place in the gardens in 2000.<sup>52, 2001</sup>

The *National Park Service Statistical Abstract 2001* states the USS Arizona Memorial, National Park Service had 1,436,006 visits in the year 2001. It has a gross area of 10.50 acres, which is federal land.<sup>136, 2002</sup>

### ***Existing Problems, Issues and Opportunities***

The *Primary Urban Center General Development Plan* states there is a shortage of community based parks and recreation facilities along the coastal plain, especially for organized sports and other active recreation. Acquisition of significant additional park space is constrained by high real estate values, few vacant parcels with favorable characteristics for recreation use, and the cost and practical difficulties of alternatives such as the use of air rights over highways. Within limited land area and high-rise apartment buildings nearby, the light and noise generated by outdoor recreational activities can cause disturbances to residential neighbors. Unsupervised and unlighted parks can also attract crime and other problems associated with urban areas.

The older and more intensively developed parts of the PUC lack sufficient parks, recreation facilities and open space. Particularly impacted are Makiki, Nuuanu, Downtown, Liliha, and Kalihi-Palama.<sup>241, 2002</sup>

### ***Future and Planned Usage***

The Primary Urban Center General Development Plan lists creating parks that draw people and activity as a future usage. The PUC should have a range of parks providing for organized sports and fitness activities and neighborhood gathering places.

Community parks and recreation facilities should be provided in and near residential neighborhoods.<sup>241, 2002</sup>

### ***Future and Planned Requirements or Changes***

The Primary Urban Center General Development Plan notes future requirements as follows:

- To acquire privately owned properties and the McGrew Point Navy land makai of the Pearl Harbor bikeway along Pearl Harbor's East Loch shoreline for recreational use.
- Optimize private sector contributions to open space through park dedication, as properties are redeveloped.
- Reassessing and reassigning, as appropriate, the use of existing park land.<sup>241, 2002</sup>

### ***Anticipated Costs for the Future***

See City and County of Honolulu Parks Summary for information.

### ***Problems, Issues and Opportunities Associated with Costs***

See City and County of Honolulu Parks Summary for information.

### ***Compare Visitor and Resident Impact***

Analysis of county documents shows that the Primary Urban Center is heavily impacted by visitors. The USS Arizona Memorial receives a significant number of visitors. The PUC contains a significant number of visitor accommodations; see City and County of Honolulu and Primary Urban Center Visitor Accommodations Summaries for information.

### ***Major Assumptions***

The *National Park Service Statistical Abstract 2001* lists the 2002 forecast for visitation at the USS Arizona Memorial as 1,453,997, which is 1.25 % more visits than in the year 2001. The 2003 forecast is 1,468,882 visits.<sup>136, 2002</sup>

## **City and County of Honolulu – Primary Urban Center – Police, Fire and Emergency Services**

### ***Present Capacity and Usage***

The *Honolulu Police Department 2000 Annual Report* describes the police districts. District One in Downtown Honolulu is the core of this district, which stretches from Liliha Street to Punahou Street. The command offices are located at the Alapai Headquarters.

- The district administers the department's Reserve Program. Reserve officers volunteer a minimum of 20 hours per month in support of the department's mission and goals. During the year 2000, the 69 reserve officers contributed over 16,300 hours of volunteer police service to the community.

District 5 occupies about 36 square miles of Honolulu and runs from Pali Highway in the east to Aliamanu in the west.

- In September 2000, federal grant funds were received as part of a drug elimination program. As a result, District 5 was able to intensify efforts in the Kamehameha, Kaahumanu and Kalihi Valley Homes housing areas.

District 6 covers the Waikiki peninsula from Atkinson Drive in the west to the slopes of Diamond Head in the east.

- This district continues to hold orientation classes for new officers on the unique history of Waikiki and its role in Hawaiian tourism.
- The district's CRU conducted a number of sensitive investigations during the year. In one case, the CRU worked with the management and owners of a small hotel that was being used by drug dealers and prostitutes. This effort expedited the eventual demolition of the building.
- Coordinated traffic and security for many events in Waikiki.<sup>53, 2000</sup>

The *Primary Urban Center General Development Plan* lists the Honolulu Police Department services out of its Capitol District Headquarters and its Downtown-Chinatown, Waikiki, Kalihi and Pearl City Substations.

The Honolulu Fire Department serves the PUC from 21 fire community stations. It also maintains a training facility on military land near the airport.

Ambulance service, provided by the City's Emergency Medical Services Division, is currently delivered from each of the fire stations.<sup>241, 2002</sup>

### ***Existing Problems, Issues and Opportunities***

See City and County of Honolulu Police, Fire and Emergency Medical Services Summary for information.

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### ***Future and Planned Usage***

The *Primary Urban Center General Development Plan* reports that in general, existing facilities are adequate to serve expected future growth.<sup>241, 2002</sup>

### ***Future and Planned Requirements or Changes***

The *Primary Urban Center General Development Plan* states a guideline to provide support for civil defense building shelters and improved technology, equipment and training for firefighting, police protection and paramedical services as population increases.<sup>241, 2002</sup>

### ***Anticipated Costs for the Future***

See City and County of Honolulu Police, Fire and Emergency Medical Services Summary for information.

### ***Problems, Issues and Opportunities Associated with Costs***

See City and County of Honolulu Police, Fire and Emergency Medical Services Summary for information.

### ***Compare Visitor and Resident Impact***

Analysis of county documents shows that many visitor rescues are due to unfamiliarity with terrain and local environment. See City and County of Honolulu Police, Fire and Emergency Medical Services Summary for information.

### ***Major Assumptions***

See City and County of Honolulu Introduction and Police, Fire and Emergency Medical Services Summaries for information.

## City and County of Honolulu – Primary Urban Center – Visitor Accommodations

### *Present Capacity and Usage*

The *2001 State of Hawaii Data Book: A Statistical Abstract* gives tax rates and job count for the visitor accommodation industry.<sup>252, 2001</sup>

**Table 2.39 -- Visitor accommodations 1999 and 2000**

| Year/Island | Total | Properties |       | Total  | Units  |       |
|-------------|-------|------------|-------|--------|--------|-------|
|             |       | Hotels     | Condo |        | Hotels | Condo |
| <b>1999</b> |       |            |       |        |        |       |
| Oahu        | 194   | 163        | 31    | 35,861 | 31,956 | 3,905 |
| Waikiki     | 116   | 90         | 26    | 31,249 | 27,898 | 3,351 |
| <b>2000</b> |       |            |       |        |        |       |
| Oahu        | 200   | 172        | 28    | 36,303 | 32,774 | 3,529 |
| Waikiki     | 117   | 93         | 24    | 31,557 | 28,578 | 2,979 |

Source: *2001 State of Hawaii Data Book*

**Table 2.40 -- Hotel room occupancy and room rates: 2000**

|                    | Percent occupied | Average daily room rate (dollars) | Average revenue per available room (dollars) |
|--------------------|------------------|-----------------------------------|--|
| <b>State total</b> | <b>77.19</b>     | <b>151.79</b>                     | <b>118.25</b>                                |
| <b>Oahu</b>        | <b>79.00</b>     | <b>121.36</b>                     | <b>95.88</b>                                 |
| <b>Waikiki</b>     | <b>79.53</b>     | <b>122.67</b>                     | <b>97.56</b>                                 |

Source: *2001 State of Hawaii Data Book*

The *Primary Urban Center General Development Plan (PUC)* describes that resort zoning is intended as a mixed use designation consisting primarily of resort hotels, timeshares, and other apartments used as temporary visitor units (TVUs) and supporting commercial uses, such as shops, restaurants, and entertainment. This designation only applies to the Waikiki, Marina, Hobron and Ft. DeRussy neighborhoods.<sup>241, 2002</sup>

### **Existing Problems, Issues and Opportunities**

The *Primary Urban Center General Development Plan* expresses the following existing issues:

- In Waikiki, most of the high-rise buildings exceed present building height and density controls. Current regulations allow such “non-conforming” buildings to be re-developed under limited circumstances.
- The mauka portions of the Waikiki Special District have numerous older hotel and resort condominium units in use as visitor accommodations.

- Waikiki is substantially built out therefore other PUC sites outside Waikiki are needed.
- A strong demand for Oahu resort destinations outside of Waikiki is as yet unproven.
- The need for additional visitor accommodations near the Convention Center and the Downtown waterfront.
- There is a demand for B&B establishments that would generate income directly to local families.<sup>241, 2002</sup>

### ***Future and Planned Usage***

The *Primary Urban Center General Development Plan* notes that provisions need to be made for moderate expansion of visitor facilities.

- The number of visitor units is projected to grow to approximately 37,800 units in 2025. This represents approximately 28 percent of the projected islandwide increase.
- Growth in secondary resort locations has been slow and unless development accelerates there may be additional demand for new visitor units in the PUC.
- The State's Aloha Tower Development Corporation has plans to develop a hotel at Aloha Tower.
- The Convention Center is expected to attract larger numbers of visitors to Honolulu. Increased numbers of visitors will create demand for additional visitor accommodations.<sup>241, 2002</sup>

### ***Future and Planned Requirements or Changes***

The *Primary Urban Center General Development Plan* states the following needed changes:

- The City and State need to adopt policies that will elicit private reinvestment in Waikiki's physical plant.
- Provide opportunities for the development of visitor units in Ala Moana/Kakako/Downtown corridor. Hotels serving the Convention Center should be within a 5 minute walk (one-quarter mile) and located on commercially zoned parcels along major thoroughfares.
- Provide opportunities for the development of village inns in existing commercial centers. Potential areas include Kapahulu, Kaimuki, the King/Beretania corridor, Kapalama, Pearl Ridge, and Pearl City.
- Allow Bed and Breakfast establishments in residential neighborhoods.<sup>241, 2002</sup>

### ***Anticipated Costs for the Future***

Analysis of county documents shows that visitor accommodations are privately owned and operated. Information on future costs was not available from county documents.

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### ***Problems, Issues and Opportunities Associated with Costs***

Analysis of county documents shows that visitor accommodations are privately owned and operated. Private companies will expand their operations as demanded by market conditions. In the Waikiki area there is little opportunity for building of new additional visitor accommodations and the focus is on renovation of existing units.

### ***Compare Visitor and Resident Impact***

The *Primary Urban Center General Development Plan* states the plan for a vibrant and livable Waikiki. This plan will serve to improve the quality of life in Waikiki for both residents and visitors. <sup>241, 2002</sup>

### ***Major Assumptions***

Analysis of county documents shows that visitor accommodations are privately owned and operated. Information on major assumption was not available.

## **City and County of Honolulu – Primary Urban Center – Visitor Related Area**

### ***Introduction***

All hotels and other buildings with parking or habitable floors below sea level have one or more sump pumps for dewatering. Measurements taken at the monitor wells indicate that inflow of a rising tide exceeds the combined rate of sump pump discharge.

### ***Water Quality***

Existing waterlines in the Waikiki area are interconnected, which increases service reliability by providing alternate routes for flows to reach users and to stabilize water pressure during periods of heavy usage.

### ***Sewage***

Wastewater collected by the sanitary sewer system is conveyed to the City's Sand Island Wastewater Treatment Plant (WWTP), which serves the Honolulu area from Kuliouou to Moanalua. The Sand Island WWTP is a primary treatment plant designed to treat an average flow of 82 million gallons per day (mgd). Presently, the plant is treating an average flow of 68mgd, indicating an available capacity of 14mgd.

The major sanitary sewer-lines collecting wastewater generated in Waikiki convey flows in the mauka direction to the beach Walk Wastewater Pump Station (WWPS), which is located on Kuhio Avenue in a lot south of Kaiolu Street and Kuhio Avenue. The Beach Walk WWPS is designed to handle an average daily flow of 15.7mgd and a peak flow of 36mgd. The average daily flow for the first six months of year 2001 was 11.36mgd, indicating an available capacity of approximately 4.3mgd.

### ***Storm Water***

The storm drainage system in the vicinity of the project area is owned by the City and County of Honolulu and maintained by its Department of Facility Maintenance. Based on the storm drain facility map from the City Department of Planning and Permitting, storm runoff in the vicinity of the project site is collected by underground drainage facilities along Lewers street and Beach Walk and discharged into the ocean through several lines between the shore and the intersection of Kalia Road and Saratoga Road.

### ***Police***

In 2000, there were 5,386 reported offenses in District 6. The majority of the offenses were related to larceny (4,235 offenses) and burglary (608 offenses). These are reported to the police eight to ten times per day. District 6 comprises twelve beats from Beat 650 to 662.

## ***Fire***

The Waikiki area is served by three fire stations.

## ***Emergency Services***

In an emergency response, either EMS personnel or the nearest fire station is notified. EMS uses a global tracking system that places each vehicle within 30 feet of its current location. The average EMS response time is four minutes; for HPD, eight minutes.

## ***Coastal Water Quality***

The marine area off Waikiki consists of a poorly defined embayment within Mamala Bay that extends from the Ala Wai Channel to the Kapahulu Groin area. The entire area has been altered substantially over the past decades, and was created from infilling of wetlands following the construction of the Ala Wai Canal. The shoreline of the Waikiki area is rimmed with a sand beach. Periodically the beach is nourished by imported sand owing to loss by movement of sand beyond the littoral cell. Offshore of the beach, the shallowest region consists of a sandy flat that extends from the shoreline offshore for a distance of several meters. Beyond the sandy zone, the inner area of Waikiki embayment consists of a relatively flat limestone platform that has a depth of 0.5-2 meters. Much of the platform is covered with a variety of fleshy algae. In addition, a channel of sand, called the Halekulani Sand Channel extends from the shoreline past the reef crest.

Results of a water chemistry assessment reveal that water quality throughout the area off Waikiki is surprisingly good with respect to State of Hawaii Water Quality Standards. Only a few samples have concentrations above the most stringent set of criteria.

Without doubt, Waikiki is probably the most utilized marine recreational area in the state, and is also located off a fully developed urban area. The result of this study that only several of the samples exceeded State of Hawaii water quality standards indicates that inputs from land or urbanization appear to have little effect on marine water quality. The results of the oil and grease and TPH sampling that showed no detectable material in the near shore ocean corroborate the finding of little impact to water quality from human activities.

The Ala Wai Canal effectively intercepts all surface runoff from the watersheds inland of Waikiki. It has been documented that water in the canal is severely impacted by human activities. During the time of sampling, drainage of the canal to the ocean appears to have virtually no effect on water quality in the ocean off of Waikiki.

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### ***Marine Health***

The biotic community structure of the Waikiki area is divided into two major zones. The inner zone, consisting of the region from the shoreline over the reef platform to the reef crest is primarily a sand and rubble-covered flat inhabited primarily by various species of algae. Reef corals, and most other epibenthic organisms, are sparse in the inner zone, primarily as a result of the continuous shifting of sand that is kept in motion by wave surge. The inner zone is the area that would be subjected to changes in water quality resulting from inputs from land.

The second major zone, which originates just seaward of the reef crest and extends seaward, is composed of a relatively flat “hardpan” limestone bottom. Because this zone is at depths below most of the destructive force of waves, and beyond the limits of sand scour, reef corals occur abundantly. As is typical on most coral reefs in Hawaii, the most dominant corals are *Porites lobata* and *Pocillopora meandrina*.

### ***Native/Extinction Species***

Terrestrial fauna on Waikiki is limited to rats, mice and feral cats. The identification of avifauna that flock or reside within the area include the common mynah, cardinals, pigeons, doves, house finches, rice birds, and mockingbirds. These are common birds found throughout the urban areas of Honolulu. There are no rare, threatened, or endangered species on the site.

### ***Visual Resources***

Within the objective of the City and County of Honolulu’s Land Use Ordinance (LUO), there is an emphasis placed upon maintaining and improving the mauka views from public viewing areas in Waikiki, especially in public streets.

## **City and County of Honolulu – Primary Urban Center – Visitor Related Area 2**

### ***Introduction***

The environmental impact statement for the Voyager Submarines Hawaii Artificial Reef Installation was required prior to the installation of two artificial reefs (sunken ships) approximately  $\frac{3}{4}$  mile offshore of Ala Moana Beach Park in depth of 90 to 100 feet. The artificial reef is intended to enhance the habitat and promote fish and coral growth. In addition, six submerged buoys will be installed to facilitate site access and prevent anchor damage to the marine environment.

### ***Bottom Characteristics***

The area off Ala Moana Beach Park that comprises the Voyager dive site can be described as an exposed limestone shelf and ledge roughly semi-circular in shape with diagonal distance across of approximately 1,350 feet. It is estimated that the limestone shelf is composed of an ancient coral reef that formed 79,000 to 110,000 years ago. This ancient reef was subsequently exposed and eroded during periods of lower sea level, and then drowned by sea level rise. Wave action during periods when the shelf was approximately at sea level probably cut the ledge (Fletcher and Sherman, 1995). In some areas, the vertical relief of the ledge is on the order 6 to 10 feet. Sections of the ledge contain undercuts and small ledges which serve as desirable shelter areas for fish. The top of the limestone shelf was covered with a veneer of coarse calcareous sand and rubble fragments. Most of the rubble fragments were identified as pieces of reef corals that had likely been broken from the living colonies by storm waves. The depth of sand on the top of the shelf feature was very thin; one sweep of a hand cleared the sand away to reveal solid limestone substratum.

The proposed sites for deployment of the vessels lies generally seaward of the limestone shelf. These sites consist of relatively barren sand flats. The sand surface in this region consisted of depths of only a very thin layer to several inches deep and was easily brushed or dug away by hand to reveal a solid limestone platform.

During the underwater surveys of the ship deployment areas, the sand plains did not have ripples indicative of wave or current motion. Rather, the sand surfaces were covered with a thin green veneer that likely consisted of benthic diatoms or benthic algae. The presence of this green film is indicative of quiet water conditions with water velocities insufficient to create sediment resuspension.

### ***Fish Communities***

Number of species ranged from 3 to 17, while number of individuals ranged from 4 to 133 at the seven stations. In general, fish were more abundant and the assemblages more diverse in areas with higher vertical relief, while abundance

was lowest on the flat sand areas. There was also a distinct association between location on the reef and the feeding guilds of fishes. The dominant fishes upcurrent of the reef ledge were midwater plankton feeders including the butterfly fishes *Chaetodon miliaris* and *Hemitaenichthys polylepis*, and the surgeon fish *Naso lituratus*. Along the ledge, the most dominant species were benthic feeders, including goat fishes (e.g. *Parupeneus multifasciatus*), wrasses (e.g. *Thalassoma duperrey*) and parrot fishes (*Scarus* spp. ) Trigger fishes (Family *Balistidae*) were common wherever holes or depressions occurred on the hardpan surface of the reef.

While not included in the quantitative survey, a large school of `opelu (*Decapterus macarellus*) was observed in the water column and appeared to follow the submarine throughout the dive. Several large kahala (*Seriola dumerili*) also appeared to be attracted to the submarine. A blacktip shark (*Carcharhinus limbatus*) was sighted on several occasions traversing the dive site.

### ***Endangered and Protected Species***

Three species of marine animals that occur in Hawaiian waters have been declared threatened or endangered and are under Federal jurisdiction. The threatened green sea turtle (*Chelonia mydas*) occurs commonly in the nearshore areas of Hawaii, and is known to feed on selected species of macroalgae. The endangered hawksbill turtle (*Eretmochelys imbricata*) is infrequently observed in Hawaiian waters.

The major nesting site in the Hawaiian Islands for the green turtle is French Frigate Shoal (Balazs 1980). Sporadic rare nesting events have occurred in the main islands (J. Naughton, personal communication). One turtle was observed on the bottom during the course of the submarine survey dive. The turtle had multiple tumors on its head and front appendages. Voyager personnel report sightings of two turtles, including the one with tumors, on a regular basis.

Populations of the endangered humpback whale (*Megaptera novaeangliae*) are known to winter in the Hawaiian Islands from December to April. The Hawaiian Monk Seal (*Monachus schauinslandi*) also has been observed sporadically in the main Hawaiian Islands.

### ***Water Quality***

One consideration of the proposed activity is potential alteration of existing water chemistry caused by placement of the vessels. In order to determine if such alterations occur, a baseline of present water chemistry composition at the dive site was established. Water samples were collected at the surface, at mid-water, and near the bottom at 6 stations in the vicinity of the dive site.

Water quality constituents that were evaluated include the 10 specific criteria designated in Chapter 11-54 of the Water Quality Standards, Department of Health, State of Hawaii. These criteria include: total nitrogen (TN), nitrate + nitrite nitrogen ( $\text{NO}_3^- + \text{NO}_2^-$ ), ammonium ( $\text{NH}_4^+$ ), total phosphorus (TP), chlorophyll a

(CHI a), turbidity, salinity, pH and temperature. In addition, orthophosphate phosphorus (P04'3) and silica (Si) are also reported. This suite of constituents will provide the basis for the initial phases of any water quality monitoring programs that might be required for regulatory compliance by State or Federal agencies.

Comparison of the values measured at the Voyager site and State of Hawaii water quality standards reveals that none of the measured values exceed the "not to exceed the given value more than 10% or 2% of the time" criteria for either wet or dry conditions. Based on these comparisons, it appears that at present typical water quality in the dive site area is well within DOH standards, and does not appear to be affected by any factors associated with the current activities in the area.

### ***Ocean Activities***

Fishing is a popular activity that takes many forms in the survey area, including fishing from boats, from shore, from the edge of Ala Moans Reef, and especially along the edges of the harbor channels. A number of free swimming and schooling species are found nearshore and in the boat channels and the swimming channel at Ala Moans Beach park, including. papio, mullet, and halalu, when they are in season. Many common reef species are found offshore of Ala Moans Reef.

Approximately 12 of Oahu's canoe clubs train in the survey area. The majority of them are headquartered along the Ala Wai Canal and use the canal for training until August. After August they begin long distance training and leave the canal to paddle in the open ocean. A popular training course is from the outside harbor markers at the Ala Wai to the outer markers at Kewalo Basin. Training runs on this course can be easily timed, and several clubs are frequently present at once. Since this is a clean water area, it is also used to practice crew changes. Changes occur during long distance races when one paddler replaces another. An escort boat will drop one paddler (or more) into the ocean ahead of the canoe. When the canoe comes abreast of the paddler(s) in the water, the paddler(s) in the boat who are being replaced jump out and their alternates climb in. The escort boat then retrieves the paddler(s) in the water. Most practices occur after 5 PM in the evening, and the course runs inshore of the proposed wreck site.

Outrigger canoes also transit the waters of the survey area during the races. During the long distance season approximately 10 races are held, a few of which transit the survey area.

The waters in the survey area are a transit area for kayakers who have launched their craft in other areas. During the spring and summer months long distance kayak races are held on Oahu; one formerly used course finished at Kewalo Basin Park and passed through the survey area.

Recreational power boats are common throughout the survey area. The majority of them are owned by fishermen and are launched from either Ala Wai Boat Harbor or Keehi Boat Harbor.

Parasailing, towing someone in a parachute with a high speed power boat, is a commercial activity that occurs seaward of the survey area.

Reef walking is an infrequent low tide activity on Ala Moans Reef. Some individuals and families go on their own, but most of the reef walks are organized and conducted by an experienced leader, usually a school teacher. The reef flat is recognized by the Department of Education as an educational reef walking site and is listed in its manual A Compendium of Coastal Field Sites as "Kewalo Basin". The site is accessed from Kewalo Basin park and is considered to be a good area for viewing fish, seaweed and invertebrate organisms such as sea anemones, shells, sea urchins, and brittle stars.

Recently, the City and County of Honolulu, Department of Parks and Recreation stopped issuing permits for commercial introductory scuba diving classes in the Ala Wai Channel at the east end of Magic Island. Prior to this, the introductory scuba diving for visitors, primarily Japanese visitors, was a common scuba diving activity in the survey area. Introductory classes were held in the Ala Wai Channel at the east end of Magic Island in Ala Moans Beach Park. The channel offered one of the few scuba diving sites near Waikiki that is easily accessible by land. Introductory classes were offered by: Sunshine Scuba, Hawaii Pro Dive, Breeze Hawaii, Ocean Concepts, Fantasea and Island Divers. Aaron's Dive Shops, other diver shops and independent dive instructors offered introductory and advanced classes to visitors and residents, especially during the winter months when high surf precludes the use of west and North Shore dive sites. Some dive shops also offer boat dives in the survey area, but this was a less frequent activity than the introductory shore dives.

Other survey area users who scuba dive include spear fishermen, underwater surround net fishermen and members of the Honolulu Fire Department's rescue squads conducting training. HFD has two heavy rescue squads. Rescue 1 and Rescue 2, and their members periodically do training dives seaward of Ala Moans Reef.

Both the Hawaii Yacht Club and the Waikiki Yacht Club are headquartered in the Ala Wai Boat Harbor, and their members regularly transit the survey area. In addition to general sailing traffic, every Friday night at 5:30 p.m. Waikiki Yacht Club members hold their Friday Night Race. The race course goes from the outside buoy of Ala Wai Channel to the outside buoy of the Honolulu Harbor Main Channel and back. The course of this race, however, usually keeps their boats outside the survey area. Some night sailing occurs in the survey area by boats from the yacht clubs.

Competitive sailing in Honolulu takes three forms: local yacht club races, large scale professional competitive race series based out of Honolulu such as the Kenwood Cup and races in which Honolulu is the final destination such as the Transpac. The Transpac and the Kenwood Cup occur on alternate years. Competitive sailing yachts transit the water offshore the survey area during certain legs of their races.

For the past 15 years the Look Laboratory of Oceanographic Engineering, University of Hawaii has had an in-water Test Range in approximately 40 feet of water on the west side of Kewalo Basin Channel . The range includes two artificial reefs, one constructed of automobile tires and one constructed of concrete blocks, and two flat 8' x 8' platforms constructed out of fiberglass I-beams and PVC decking that are used for mounting instruments. This site and other nearby sites within the general area have been used by members of the Look laboratory staff to conduct a variety of ocean engineering tests, including instrumentation tests, drogue and dye studies, and sampling water for turbidity, salinity and temperature. Many of these activities are conducted each summer by students who are taking ocean engineering classes.

Prior to the commencement of Voyager's submarine tours, limited research activities were conducted on the east side of the Kewalo Channel, in the immediate vicinity of the present submarine operations. Look Lab's activities in this area consisted of attaching taut line moorings and instrument strings to concrete blocks on the ocean bottom and monitoring the wave and current measurement instruments.

Sunbathing and swimming are the two most popular activities in the survey area. Sunbathers and swimmers are concentrated primarily at Ala Moana Beach Park, including the Magic Island lagoon at the east end of the park. The City and County of Honolulu's Water Safety Division normally staffs all five of its lifeguard towers daily to watch the large numbers of swimmers. The beach is especially attractive to families with children.

Open Ocean Swimming. Ala Moana Beach Park is fronted by a 1000 meter long channel that was originally dredged as a boat channel between Ala Wai Boat Harbor and Kewalo Basin. The portion of the channel fronting the park was isolated by the construction of landfills at either end, and now offers an excellent venue for protected open ocean swimming. It is used daily by members of the Waikiki Swim Club, Hawaii Swim Club Masters, other swim clubs and by many independent swimmers. However, the ocean swimming in the survey area is confined to the channel, and no open ocean swimming occurs outside Ala Moans Reef. An annual five mile, long distance swim starts at Kaimana Beach at Diamond Head and turns around at the Ala Wai Channel buoy at eastern edge of the survey area, but the swim does not enter the survey area.

At least 11 primary surfing sites are located along the seaward edge of Ala Moans Reef, and they are from east to west: Islands, Americas, Bombora, Baby Haleiwa, Big Lefts, Courts, Concessions, Big Rights, Shallows, In Betweens, and Kewalos. Each of these sites may attract from 20-40 surfers and bodyboarders, so during periods of high surf there may be over 400 surfers in the water offshore Ala Moans Beach Park. Surfing contests are occasionally held at Courts and Kewalos.

One primary surfing site, Point Panic, is found to the west of Kewalo Channel fronting Kakaako Waterfront Park. It is reserved exclusively for bodysurfing and is the site of an annual bodysurfing championship put on by the Honolulu Bodysurfing Club. The Hawaii Administrative Rules; Part III, Ocean Waters, Navigable Streams and Beaches (effective Feb. 24, 1997) by the State Division of Boating and , Ocean Recreation regulates the activities there. Paragraph 13-254-13 contains the rules governing the Point Panic Ocean Waters which includes the following: a. No person shall operate a surfboard in the restricted area of the Point Panic Ocean Waters, and b. Point Panic Ocean Waters are primarily reserved for bathing, swimming, bodysurfing and paipo board riding.

Most of the Oahu tour boat industry operates between Hawaii Kai and Pearl Harbor. The vessels range from tourist catamarans to 100 foot cruise vessels that offer tourists dinner cruises and various excursions. Some of the largest vessels are berthed in Honolulu Harbor, but the majority of them are kept in Kewalo Basin, a 126-slip harbor used exclusively to berth commercial boats. The balance of the slips are filled by commercial fishing boats that do not offer cruises or charters. In general, the majority of the boats in Kewalo Basin pass through the survey area only when they enter or exit the harbor through Kewalo Basin Channel. The charter fishing boats may fish out to 20 miles offshore of the island, and the cruise boats usually tour seaward of the survey area. However, there are several exceptions, one of which was noted previously. Several cruise boats now offer night fishing tours immediately seaward of Ala Moans Reef. In addition, some of the cruise boats that conduct evening dinner and nightclub cruises also come closer to shore at night and transit the same area. Other exceptions during the day include boats that offer glass bottomed boat tours. They tour immediately seaward of Ala Moana's reef, but inshore of the project site.

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## **City and County of Honolulu – Primary Urban Center – Private Transportation**

### ***Present Capacity and Usage***

No documentation was uncovered regarding private transportation at the community level. Therefore, no evaluation was made.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – Primary Urban Center – Energy Systems**

### ***Present Capacity and Usage***

No documentation was uncovered regarding energy systems at the community level. Therefore, no evaluation was made. See City and County of Honolulu Energy Systems summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – Primary Urban Center – Sewer Systems**

### ***Present Capacity and Usage***

There was little to distinguish private sewer systems from public sewage at the community level. See City and County of Honolulu Sewage summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – Primary Urban Center – Coastal Water Quality**

### ***Present Capacity and Usage***

There was little documentation for coastal water quality at the community level. See State of Hawaii Coastal Water Quality summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – Primary Urban Center – Marine Ecosystem Health**

### ***Present Capacity and Usage***

There was little documentation for marine ecosystem health at the community level. See State of Hawaii Marine Ecosystem Health summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – Primary Urban Center – Forestry / Green Space**

### ***Present Capacity and Usage***

There was little documentation for forestry / green space at the community level. See State of Hawaii Forestry / Green Space summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – Primary Urban Center – Air Quality**

### ***Present Capacity and Usage***

There was little documentation for air quality at the community level. See State of Hawaii Air Quality summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – Primary Urban Center – Beach Erosion**

### ***Present Capacity and Usage***

There was little documentation for beach erosion at the community level. See State of Hawaii Beach Erosion summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – Primary Urban Center – Invasive Species**

### ***Present Capacity and Usage***

There was little documentation for invasive species at the community level. See State of Hawaii Invasive Species summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – Primary Urban Center – Other Natural / Scenic Resources**

### ***Present Capacity and Usage***

There was little documentation for riparian / wetlands, native species or other natural / scenic resources at the community level. See State of Hawaii Natural / Scenic Resources summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

## City and County of Honolulu – Central Oahu – Water Quality and Quantity

### ***Present Capacity and Usage***

Currently, Central Oahu uses 20.7 million gallons of water per day (MGD). The sustainable yield according to the Oahu Board of Water Supply is 23 MGD. The Board of Water Supply evaluated the water development needs of the existing residential and commercial (including retail, office, resort, recreational, and industrial) development likely by 2025 as a result of implementation of the new *Ewa Development Plan* and the proposed *Central Oahu Sustainable Communities Plan*.<sup>92, 2002</sup>

### ***Existing Problems, Issues and Opportunities***

The *Central Oahu Sustainable Communities Plan* notes the following existing issues with water in Central Oahu.

- An adequate supply of non-potable water should be developed for irrigation and other suitable uses in Central Oahu in order to conserve the supply of potable water.
- The Pearl Harbor aquifer is the most cost effective and accessible water resource of potable quality and it is needed to support the existing and future domestic potable water uses described in the development plans.
- Experiences with increasing chloride, nitrate and pesticide contamination of groundwater indicate that activities on the surface of the land can have a detrimental effect on the quality of drinking water. Non-potable water used above Pearl Harbor aquifer should be low in total dissolved solids to protect the quality of drinking water withdrawn from wells located down-gradient of the application.
- Water is needed to meet the diversified agricultural needs for Ewa and Central Oahu along with high quality recharge of the Pearl Harbor aquifer. A number of potential sources are: caprock, surface water, spring waters, Waiahole Ditch Water and wastewater effluent.<sup>92, 2002</sup>

### ***Future and Planned Usage***

The *Central Oahu Sustainable Communities Plan* states that the Board of Water Supply projects that an additional 17 million gallons per day (mgd) of potable water and approximately 26mgd of non-potable water will be needed in Ewa and Central Oahu by 2025 to meet projected. Agricultural demand for non-potable water for the 13,500 acres of agricultural land in Ewa and Central Oahu protected from development is estimated to be 38mgd. Meeting this demand will require reallocation of water within the island-wide system, as well as development of new sources.<sup>92, 2002</sup>

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### ***Future and Planned Requirements or Changes***

*The Central Oahu Sustainable Communities Plan* notes that as part of a Consent Decree with the State DOH for the Wahiawa WTP, the City plans to upgrade the Wahiawa WTP to provide tertiary treatment of wastewater that would allow unrestricted usage of the effluent for irrigation and application purposes. This reclaimed water will continue to be discharged into Lake Wilson as has been done for over 50 years. The effluent will be indirectly used for irrigation when water from Lake Wilson is applied to croplands.<sup>92, 2002</sup>

### ***Anticipated Costs for the Future***

Some anticipated costs for the future include:

- Upgrades to the Wahiawa WTP to provide tertiary treatment of wastewater;
- Construction of storage and distribution system for non-potable water; and
- Development of new potable water supply sources and upgrades to potable water supply infrastructure.

### ***Problems, Issues and Opportunities Associated with Costs***

See City and County of Honolulu Water Summary for information.

### ***Compare Visitor and Resident Impact***

See City and County of Honolulu Water Summary for information.

### ***Major Assumptions***

See City and County of Honolulu Introduction for information.

## City and County of Honolulu – Central Oahu – Sewage

### ***Present Capacity and Usage***

*The Central Oahu Sustainable Communities Plan* describes that the Department of Design and Construction has predicted an increase in wastewater generation for the Central Oahu District. To meet this increase, the primary treatment capacity at the Honouliuli Wastewater Treatment Plant (WTP) will need to be increased from the **current maximum capacity of 38 million gallons per day (mgd) to 51mgd by 2020**. The increase will be needed to meet the projected population growth in Ewa and Central Oahu.

According to the *Central Oahu Sustainable Communities Plan* the City's Wahiawa wastewater treatment plant (WTP) is operating under a Consent Decree from the State Department of Health. Under the Consent Decree, the City has agreed to upgrade the Wahiawa WTP to produce tertiary treatment or R-1 Quality effluent (R-1 Quality is the highest quality of reclaimed water prescribed by State Department of Health reclamation guidelines) and deepen the outfall in order to continue discharging to Wahiawa Reservoir (Lake Wilson). The R-1 water will then be discharged into Wahiawa Reservoir (Lake Wilson) through a new 24-inch outfall at a depth of approximately 40 feet below the water level. A draft Environmental Assessment for the proposed improvements was released in December 1998. The plant now treats approximately 2.0mgd domestic wastewater collected from Wahiawa Town, Whitmore Village, and the Navy Naval Computer and Telecommunications Area Master Station communities.

The City is also considering reactivating and upgrading the Mililani WTP (which is currently out of operation) to provide R-1 quality effluent for irrigation purposes at Royal Kunia, Waiola, and Wahiawa. <sup>92, 2002</sup>

### ***Existing Problems, Issues and Opportunities***

The following policies outlined in the *Central Oahu Sustainable Communities Plan, 2002* apply to wastewater treatment in Central Oahu:

- All wastewater produced by new developments in Central Oahu should be connected to a regional or municipal sewer service system;
- Where feasible, effluent should be treated and used as a source of non-potable water for irrigation and other uses; and
- Wastewater treatment plants should be located in areas shown as planned for industrial use and away from residential areas. A City review and approval process, which provides adequate public notice and input, should be used for any major new private wastewater treatment plant. Other system elements, such as pump stations and mains, should not require such comprehensive review and approval. <sup>92, 2002</sup>

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### ***Future and Planned Usage***

See City and County of Honolulu Sewage Summary for information.

### ***Future and Planned Requirements or Changes***

The Department of Design and Construction estimates treatment/disposal capacity at the Honolulu Wastewater Treatment Plant (WTP) will need to be increased to 51mgd by 2020 to meet projected population and economic growth in Ewa and Central Oahu resulting from implementation of the revised Plans. In addition, the capacity of specific sewer lines and pump stations will need to be increased. <sup>92, 2002</sup>

### ***Anticipated Costs for the Future***

See City and County of Honolulu Sewage Summary for information.

### ***Problems, Issues and Opportunities Associated with Costs***

See City and County of Honolulu Sewage Summary for information.

### ***Compare Visitor and Resident Impact***

By 2025, the *Central Oahu Sustainable Communities Plan* Area is expected to experience moderate growth as existing areas zoned for residential development are built out. The population is projected to grow from almost 149,000 people in 2000 to over 173,000 in 2025. If the projections are correct over 11,000 new housing units will have been built since 2000 in master-planned communities. <sup>92, 2002</sup>

### ***Major Assumptions***

See City and County of Honolulu Sewage and Central Oahu Water Summaries for information.

## **City and County of Honolulu – Central Oahu – Solid Waste Disposal**

### ***Present Capacity and Usage***

The *Solid Waste Integrated Management Plan* prepared by the Department of Public Works and adopted by the City Council in 1995 identified existing landfills, which could be expanded and potential sites for developing new landfills to provide new capacity. No potential sites were identified for Central Oahu because the area is considered a groundwater recharge area.

While the City is augmenting the number and scope of its waste diversion programs, most of Central Oahu's solid waste will continue to receive final treatment and disposal either through incineration at the H-POWER plant or disposal at landfills in other areas. The Waipahu Incinerator, which processed approximately 130,000 tons of solid waste per year, was closed in 1995.<sup>92, 2002</sup>

### ***Existing Problems, Issues and Opportunities***

The *Central Oahu Sustainable Communities Plan* notes the following existing issues.

- Siting and/or expansion of sanitary landfills should be analyzed and approved based on islandwide studies and siting evaluations; and
- A City review and approval process which provides adequate public notice and input, complete technical analysis of the project, and approval by the City Council, should be used for any new or major modification of private landfills, incinerators, garbage-to-energy plants, refuse convenience centers, or other major solid waste handling or disposal facility.<sup>92, 2002</sup>

### ***Future and Planned Usage***

See City and County of Honolulu Solid Waste Summary for information.

### ***Future and Planned Requirements or Changes***

See City and County of Honolulu Solid Waste Summary for information.

### ***Anticipated Costs for the Future***

See City and County of Honolulu Solid Waste Summary for information.

### ***Problems, Issues and Opportunities Associated with Costs***

See City and County of Honolulu Solid Waste Summary for information.

### ***Compare Visitor and Resident Impact***

There is not much visitor impact in this community. See City and County of Honolulu Solid Waste Summary for information.

### ***Major Assumptions***

See City and County of Honolulu Solid Waste and Central Oahu Water Summaries for information.

## **City and County of Honolulu – Central Oahu – Storm Water**

### ***Present Capacity and Usage***

The *Central Oahu Sustainable Communities Plan* notes that Central Oahu can be divided into two areas for assessing drainage needs: the uplands mauka of the H-1 Freeway and the lowlands makai of the freeway. The urban developments sited on high plateaus in the Central Oahu uplands benefit from the natural flood protection provided by the deep gulches which drain storm waters and filter some pollutants. Historically, flooding problems in the uplands have only occurred in the portion of Waiakalaua Gulch, which has been developed with houses and apartments.<sup>92, 2002</sup>

### ***Existing Problems, Issues and Opportunities***

The *Central Oahu Sustainable Communities Plan* states that flooding has been more prevalent in the Central Oahu lowlands, particularly in Waipahu around Waikele Stream and in Waiawa around the lower reaches of Waiawa Stream where flood plain and wetland areas have been developed.

The discharge of drainage to Pearl Harbor has caused serious siltation problems and has further aggravated an existing water pollution problem caused by shipyard uses. Siltation causes navigation problems in the harbor and forces the Navy to dredge at frequent intervals. The City, in response to a federal government mandate, has initiated a major program to reduce non-point source pollution.<sup>92, 2002</sup>

### ***Future and Planned Usage***

See City and County of Honolulu Storm Water Summary for information.

### ***Future and Planned Requirements or Changes***

The *Central Oahu Sustainable Communities Plan* notes new rules for storm water drainage standards. These rules, which were adopted in 2000, include provisions for storm water quality and retention.

- Drainage system design should emphasize control and minimization of non-point source pollution and the retention and/or detention of storm water on-site and in appropriate open space and wetland areas.
- Storm water should be viewed as a potential irregular source of water for recharge of the aquifer, which should be retained for absorption rather than quickly moved to coastal waters.
- Natural and man-made vegetated drainageways and retention basins should be the preferred solution to drainage problems wherever they could promote water recharge, help control non-point source pollutants, and provide passive recreation benefits.<sup>92, 2002</sup>

## ***Anticipated Costs for the Future***

See City and County of Honolulu Storm Water Summary for information.

## ***Problems, Issues and Opportunities Associated with Costs***

Principles to guide the development of Central Oahu drainage systems are included in the *Central Oahu Sustainable Communities Plan*.

- **Retention and Detention.** Public and private agencies should employ methods of retaining or detaining storm water as the preferred strategy for management of non-point source pollutants in storm water. Where feasible, any open space, including parking lots, landscaped areas, mini and community parks, and public and private golf courses should be used to detain or infiltrate storm water flows to reduce their volume and runoff rates, and the amounts of sediments and pollutants transported.
- **Relation to the Regional Open Space Network.** To the extent possible, the developers should integrate planned improvements to the drainage system into the regional open space network by emphasizing the use of retention basins, creation of passive recreational areas, and recreational access for pedestrian and bicycles.
- **Preservation of Gulches as Natural Drainageways.** The major natural gulches, which are listed in Table 2.1, should be retained as flood plains and open space resources. Further development of residential, commercial, or industrial uses within the gulches should be avoided, and grading or other disturbance of gulch walls, other than what is necessary to clear the gulch of debris or other floodway obstructions or to construct and maintain drainage, access, and utility facilities, should not be allowed.
- **Preservation of Flood Plain Capacity Around Pearl Harbor.** Urban development should be restricted in the lowlands around Pearl Harbor if it reduces flood plain capacity or allows increased siltation and pollution of Pearl Harbor.
- **Restrictions on Stream Channelization.** Streams should not be channelized, and existing flood plains should be left intact except where absolutely necessary to protect existing urban development from flooding.
- **Storm Drainage Standards** (Department of Public Works, March 1986. Department of Planning and Permitting now responsible for revisions). Standards for the dedication of drainage systems to incorporate grassed swales and retention basins into the design need to be created to reflect the Sustainable Communities Plan policies, principles, and guidelines for open space. <sup>92, 2002</sup>

## ***Compare Visitor and Resident Impact***

See City and County of Honolulu Storm Water Summary for information.

## ***Major Assumptions***

See City and County of Honolulu Storm Water and Central Oahu Water Summaries for information.

## City and County of Honolulu – Central Oahu – Roads

### ***Present Capacity and Usage***

The *Central Oahu Sustainable Communities Plan* describes the existing conditions and the plans and proposals for development of Central Oahu's roadways.

The major east-west arterials of the Central Oahu roadway system include:

- The H-1 Freeway which is the major arterial road connecting Central Oahu with the Primary Urban Center,
- Farrington Highway, which functions as a secondary east-west route and as a commercial district street through Waipahu.

The three major north-south arterial highways include:

- The H-2 Freeway which extends from the H-1 Freeway at the Waiawa Interchange to Wahiawa,
- Kamehameha Highway which is the island's original major circle island route and serves as a parallel alternate route to the H-2 Freeway during peak periods and as a carrier for local traffic between Waipahu, Waikele, Waipio, Mililani, and Wahiawa, and
- Kunia Road, which links Schofield Barracks and Wahiawa with Ewa.<sup>92, 2002</sup>

### ***Existing Problems, Issues and Opportunities***

According to the 2020 Oahu Regional Transportation Plan, the existing roadway system in Central Oahu has sufficient capacity for current volumes during peak-hour traffic, but experiences congested conditions because of bottlenecks and lack of capacity on the corridor from Pearl City to Downtown Honolulu. A major bottleneck occurs at the Waiawa Interchange where the H-2 Freeway joins the H-1 Freeway.

### ***Future and Planned Usage***

The *Central Oahu Sustainable Communities Plan* notes that the substantial development of jobs in Ewa and Central Oahu (from 52,000 jobs in 2000 to 110,000 jobs by 2025) is projected to increase the number of Central Oahu residents who commute in Ewa or Central Oahu. It is also projected that the number of commuters traveling to the PUC from Ewa and Central Oahu will still increase at a lower rate if development of the Secondary Urban Center was not supported.<sup>92, 2002</sup>

### ***Future and Planned Requirements or Changes***

The *Central Oahu Sustainable Communities Plan* lists the following future changes contained in the 2020 Oahu Regional Transportation Plan (November 1995) includes a number of major improvements for Central Oahu including:

- Widening of Kamehameha Highway to four lanes between Ka Uka Boulevard and the Lanikuhana Avenue intersections;
- Widening of the existing High Occupancy Vehicle (HOV) lane inbound connector and bridges through the Waiawa Interchange to provide an outbound HOV lane in the afternoon peak hours;
- Widening of Kunia Road to 6 lanes from H-1 to Royal Kunia and to 4 lanes from Royal Kunia to Wahiawa;
- Improvement of Waipahu Street from Kamehameha Highway to Paiwa Street, either by widening and/or adding turn lanes, bus pull-out lanes, and other improvements at critical areas;
- Improvement to existing interchanges at Kunia, Mililani, Waipio, and Waiawa; and
- A new interchange at Waipio.

In addition, in 1999, the Waipahu Vision Team proposed establishing a connector road between Village Park and Waipahu using an existing cane haul road. Negotiations to acquire the right-of-way are underway.<sup>92, 2002</sup>

The OMPO Policy Committee, on March 19, 2001, also identified three new projects for inclusion for funding under the 2025 Oahu Regional Transportation Plan:

- Widening of Waipahu Depot Road makai of Farrington Highway;
- Realignment of Farrington Highway eastbound near Waipahu Depot Road;
- Extension of Waipahu Street eastward to Waihona Street.

### ***Anticipated Costs for the Future***

See City and County of Honolulu Roads Summary for information.

### ***Problems, Issues and Opportunities Associated with Costs***

See State and City and County of Honolulu Roads Summary for information.

### ***Compare Visitor and Resident Impact***

There are no major attractions or accommodations in the area, just through to North Shore. See State and City and County of Honolulu Roads Summary for information.

### ***Major Assumptions***

Traffic volume on the H-2 at Kipapa is projected to increase by almost 40% by 2020, while traffic on the H-1 by Aiea is projected to increase by 10%.<sup>92, 2002</sup>

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## **City and County of Honolulu – Central Oahu – Airports**

### ***Present Capacity and Usage***

Analysis of county documents shows that there are no airports in Central Oahu region.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – Central Oahu – Harbors**

### ***Present Capacity and Usage***

Analysis of county documents shows the harbors in the Central Oahu region are owned and operated by the federal government.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

## City and County of Honolulu – Central Oahu – Parks

### ***Present Capacity and Usage***

According to the *Central Oahu Sustainable Communities Plan*, Central Oahu has less community-based park acreage than the Department of Design and Construction island-wide parks standard indicates is needed for its existing population. In 2000, Central Oahu had 233 acres of community-based parks, 65 acres, less than the island-wide standard.

Regional recreational sites include the Central Oahu Regional Park, Wahiawa Botanical Garden, Wahiawa Freshwater Park, Waipahu Cultural Garden, the proposed Waipahu Shoreline Park, and public and private golf courses.

**Table 2.41 -- Oahu Gardens and Water Parks**

| <b>Park Name</b>                | <b>Size (acres)</b> | <b>Owned By</b>                                | <b>Location</b>                                  | <b>Characteristics</b>  |
|---------------------------------|---------------------|--|--|---|
| <b>Wahiawa Botanical Garden</b> | 27                  | <b>City Department of Parks and Recreation</b> | <b>Small ravine in the center of Wahiawa</b>     | <b>1 of 5 botanical gardens</b>   |
| <b>Wahiawa Freshwater Park</b>  | 66                  | -  | <b>Surrounds Lake Wilson (Wahiawa Reservoir)</b> | <b>Only year-round freshwater shoreline and boat fishing area on Oahu</b>   |
| <b>Waipahu Cultural Garden</b>  | 49                  | <b>City of Honolulu</b>                        | -  | <b>Friends of Waipahu Cultural Garden Park (private, non-profit org) established and operates as a concession a recreated plantation village and museum</b> |

Source: *General Plan: City and County of Honolulu*

As proposed in the Waipahu Town Plan (December 1995), Waipio Peninsula Soccer Park has been built on lands on the Waipio Peninsula that are leased from the Navy.

The *State Parks of the Islands of Oahu* describes the Kukaniloko Birthstones State Monument as consisting of numerous stones within a grove of eucalyptus and coconut trees surrounded by pineapple fields. The 5-acre monument is located at the intersection of Kamehameha Highway and Whitmore Avenue on the north side of Wahiawa. <sup>131, 2002</sup>

### ***Existing Problems, Issues and Opportunities***

The *Central Oahu Sustainable Communities Plan*, 2002, illustrates existing problems, issues, and opportunities for the parks.

- The region has a 65 acres deficit in City required parks.
- New residential developments should provide land for open space and recreation purposes at a minimum of two acres of park per 1,000 residents.
- Wahiawa Botanical Garden has experienced problems with erosion, lack of financial support and patronage, vandalism, and illegal dumping.<sup>92, 2002</sup>

### ***Future and Planned Usage***

The *Central Oahu Sustainable Communities Plan* reports that based on the standards described above, an additional 114 acres of community-based parks and recreation areas would be needed to meet the needs of the projected 2025 Central Oahu population.

A major Central Oahu Regional Park of approximately 270 acres is being developed at the site known as "Waiola," north of Waikele and west of Waipio. Key features of the regional park and sports complex include:

- Professional quality baseball complex for training and tournaments;
- Softball, youth baseball, soccer and multi-purpose fields;
- Basketball and sand volleyball fields;
- Championship tennis complex with center court and 24 tennis courts;
- Community center and aquatic center with Olympic-sized swimming and diving pools;
- Four field in-line hockey complex;
- Box car racing track;
- Skateboard park; and
- Passive recreational areas for picnicking, kite-flying, and pedestrian paths.

A shoreline park and preservation area is planned for the entire length of shoreline in Pearl Harbor's West Loch and Middle Loch. The park will include the Pearl Harbor Historic Trail, the Pouhala Marsh wildlife sanctuary, and the Waipio Peninsula Soccer Park, a multi-field soccer complex on the Waipio Peninsula.<sup>92, 2002</sup>

### ***Future and Planned Requirements or Changes***

In accordance with the *Central Oahu Sustainable Communities Plan*, the future and planned usages include the following:

- Trails leading from Central Oahu Regional Park to Waikele Gulch, connecting to a trail system throughout Central Oahu's gulches, should be developed.
- A major new shoreline park should be established at Waipio Peninsula, giving access from Waipahu to the Pearl Harbor shoreline on the West Loch and Middle Loch.

- District parks within master-planned residential communities should include passive areas for picnicking and large outdoor community gatherings.
- Wahiawa Botanical Garden should be retained primarily as a gulch in its natural state.
- Wahiawa Freshwater Park should be expanded to include most of the area adjacent to the Wahiawa Reservoir, limiting public access only as necessary to protect water quality and public safety.
- A jogging path has been planned for Wahiawa Freshwater Park, but has not been constructed.<sup>92, 2002</sup>

### ***Anticipated Costs for the Future***

See City and County of Honolulu Parks Summary for information.

### ***Problems, Issues and Opportunities Associated with Costs***

The *Central Oahu Sustainable Communities Plan, 2002*, illustrates existing opportunity for the parks

- New residential developments should provide land for open space and recreation purposes at a minimum of two acres of park per 1,000 residents.<sup>92, 2002</sup>

See City and County of Honolulu Parks Summary for information.

### ***Compare Visitor and Resident Impact***

There is little impact due to visitors. Parks are primarily used by the residents.

### ***Major Assumptions***

See City and County of Honolulu Parks and Central Oahu Water Summaries for information.

## City and County of Honolulu – Central Oahu – Police, Fire and Emergency Services

### ***Present Capacity and Usage***

According to the *Central Oahu Sustainable Communities Plan*, there are currently 5 existing fire stations, 2 existing police stations and 2 emergency medical service facilities in the Central Oahu area (see map). To meet projected population and economic growth by 2025, the Fire Department recently built two stations.

Because police operate primarily in the field and do not have a need for outlying stations, the Police Department plans no new regional stations in Central Oahu. Land has been donated for a sub-station at Waikele, but construction of the sub-station is not expected in the near future.<sup>92, 2002</sup>

The Honolulu Police Department 2000 Annual Report describes the police districts.

District 2 covers the area from central Oahu to the North Shore between the Waianae and Koolau mountain ranges. The district includes Wahiawa, Mililani, Mililani Mauka, Waialua, Mokuleia, and Haleiwa.

- In mid-year 2000, the district began formal implementation of a “burglary patrol” in which off-duty officers were recruited to supplement on-duty officers to aggressively patrol certain neighborhoods, primarily in Mililani.
- Two projects were designed to improve traffic safety in the district. One targeted fatal and serious motor vehicle collisions. A study of all fatalities over the two prior years provided data on the locations, times, conditions, and causes of collisions. These data were given to watch commanders, who are responsible for developing programs to control and reduce fatalities.
- The second project was aimed at motor vehicle collisions in general. It involved a variety of enforcement and education efforts, including the use of decoy vehicles and the state Department of Transportation’s trailer-based digital speed sign.

District 3 covers the area from Red Hill to Village Park and Waipahu.

- The district’s Crime Reduction Unit (plainclothes officers) participated in a 3-month undercover drug operation with the federal Drug Enforcement Administration and the Federal Bureau of Investigation.<sup>53, 2000</sup>

### ***Existing Problems, Issues and Opportunities***

According to the *Central Oahu Sustainable Communities Plan*, the expected population growth and development of new communities and community facilities in Central Oahu will result in a need for additional emergency medical service facilities and response units. The specific needs will depend on the size,

demographics, and location of the future population. The State Department of Health has identified a need for three new stand-alone emergency medical services facilities in Central Oahu by 2010.<sup>92, 2002</sup>

Further analysis will be required to ensure appropriate police, fire, and emergency service coverage of new developments.

### ***Future and Planned Usage***

According to the *Central Oahu Sustainable Communities Plan*, adequate staffing and facilities are needed to ensure public safety. New development should be approved only if staffing and facilities will be adequate to provide fire and police protection and emergency medical services when development is completed.<sup>92, 2002</sup>

### ***Future and Planned Requirements or Changes***

There is no immediate need for facilities, but manpower is needed. See City and County of Honolulu Police, Fire and Emergency Medical Services Summary for information.

### ***Anticipated Costs for the Future***

Need money for funding additional positions as the need arises and for retaining personnel. See City and County of Honolulu Police, Fire and Emergency Medical Services Summary for information.

### ***Problems, Issues and Opportunities Associated with Costs***

See City and County of Honolulu Police, Fire and Emergency Medical Services Summary for information.

### ***Compare Visitor and Resident Impact***

There is little visitor impact, mostly residential. See City and County of Honolulu Police, Fire and Emergency Medical Services Summary for information.

### ***Major Assumptions***

See City and County of Honolulu Police, Fire and Emergency Medical Services Summary for information.

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## **City and County of Honolulu – Central Oahu – Visitor Accommodations**

### ***Present Capacity and Usage***

Analysis of county documents shows that there are no major visitor accommodations in the Central Oahu. Accommodations are limited to Bed and Breakfast and vacation rentals units that are unregulated and unaccounted for.

### ***Existing Problems, Issues and Opportunities***

Analysis of county documents shows that Bed and Breakfast and vacation rentals are unregulated.

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – Central Oahu – Private Transportation**

### ***Present Capacity and Usage***

No documentation was uncovered regarding private transportation at the community level. Therefore, no evaluation was made.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – Central Oahu – Energy Systems**

### ***Present Capacity and Usage***

No documentation was uncovered regarding energy systems at the community level. Therefore, no evaluation was made. See City and County of Honolulu Energy Systems summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – Central Oahu – Sewer Systems**

### ***Present Capacity and Usage***

There was little to distinguish private sewer systems from public sewage at the community level. See City and County of Honolulu Sewage summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – Central Oahu – Coastal Water Quality**

### ***Present Capacity and Usage***

There was little documentation for coastal water quality at the community level. See State of Hawaii Coastal Water Quality summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – Central Oahu – Marine Ecosystem Health**

### ***Present Capacity and Usage***

There was little documentation for marine ecosystem health at the community level. See State of Hawaii Marine Ecosystem Health summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – Central Oahu – Forestry / Green Space**

### ***Present Capacity and Usage***

There was little documentation for forestry / green space at the community level. See State of Hawaii Forestry / Green Space summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – Central Oahu – Air Quality**

### ***Present Capacity and Usage***

There was little documentation for air quality at the community level. See State of Hawaii Air Quality summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – Central Oahu – Beach Erosion**

### ***Present Capacity and Usage***

There was little documentation for beach erosion at the community level. See State of Hawaii Beach Erosion summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – Central Oahu – Invasive Species**

### ***Present Capacity and Usage***

There was little documentation for invasive species at the community level. See State of Hawaii Invasive Species summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – Central Oahu – Other Natural / Scenic Resources**

### ***Present Capacity and Usage***

There was little documentation for riparian / wetlands, native species or other natural / scenic resources at the community level. See State of Hawaii Natural / Scenic Resources summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

## **City and County of Honolulu – Ewa – Water Quality and Quantity**

### ***Present Capacity and Usage***

The *Ewa Development Plan* reports that the Board of Water Supply projects an additional **35 million gallons per day** (mgd) of potable water and 26mgd of non-potable water will be needed in Ewa by 2020 to meet projected demand.

Agricultural demand for non-potable water for the 3,000 acres of agricultural land in Ewa protected from development by this plan could be as much as 10mgd.<sup>94, 1997</sup>

### ***Existing Problems, Issues and Opportunities***

See City and County of Honolulu Water Summary for information.

### ***Future and Planned Usage***

The *Ewa Development Plan* listed the following general policies in developing Ewa potable and non-potable water systems to meet the projected demand.

- Before zoning approval is given for new residential or commercial development in Ewa, the Board of Water Supply should either indicate that adequate potable and non-potable water is available or recommend conditions that should be included as part of the zone change approval in order to assure adequacy.
- Where required, developments should have dual water lines to allow use of non-potable water for irrigation and other appropriate uses.
- An adequate supply of non-potable water should be developed for irrigation and other suitable uses on the Ewa Plain in order to conserve the supply of potable water and to take advantage of dual water systems constructed by Ewa developers.<sup>94, 1997</sup>

### ***Future and Planned Requirements or Changes***

See City and County of Honolulu Water Summary for information.

### ***Anticipated Costs for the Future***

See City and County of Honolulu Water Summary for information.

### ***Problems, Issues and Opportunities Associated with Costs***

See City and County of Honolulu Water Summary for information.

### ***Compare Visitor and Resident Impact***

Currently, residents are utilizing the water supply. Visitor impact is limited. See City and County of Honolulu Water Summary for information.

### ***Major Assumptions***

See City and County of Honolulu Water Summary for information.

## **City and County of Honolulu – Ewa – Sewage**

### ***Present Capacity and Usage***

According to the *Ewa Development Plan*, Environmental Services estimates treatment/disposal capacity at the Honouliuli Wastewater Treatment Plant will need to be increased from existing capacity for primary treatment of **38 million gallons per day** (mgd) to almost 51 mgd by 2020 to meet projected population and economic growth in Ewa and Central Oahu resulting from implementation of the revised development plans. In addition, the capacity of specific sewer lines and pump stations will need to be increased. <sup>94, 1997</sup>

According to the *Ewa Development Plan* all wastewater produced by new developments in Ewa should be connected to a regional or municipal sewer service system. Where feasible, effluent should be treated and used as a source of nonpotable water for irrigation and other uses. Environmental Services has made a commitment to the U.S. Environmental Protection Agency and the State Department of Health to reclaim and utilize 10 million gallons a day (mgd) of wastewater island wide by the year 2001. <sup>94, 1997</sup>

### ***Existing Problems, Issues and Opportunities***

According to the *Central Oahu Sustainable Communities Plan* any new stand-alone municipal courses to serve the region should be planned for Ewa where non-potable water for irrigation uses will be available from the Honouliuli Wastewater Treatment Plant. <sup>92, 2002</sup>

### ***Future and Planned Usage***

The *Ewa Development Plan* recommends that wastewater treatment plants be located in areas shown as planned for industrial use and away from residential areas. A City review and approval process, such as the Plan Review Use process, which provides adequate public notice and input, complete technical analysis of the project, and approval by the City Council, shall be required for any major new private wastewater treatment plant. Other system elements, such as pump stations and mains, should not require such comprehensive review and policy approval. <sup>94, 1997</sup>

### ***Future and Planned Requirements or Changes***

See City and County of Honolulu Sewage Summary for information.

### ***Anticipated Costs for the Future***

See City and County of Honolulu Sewage Summary for information.

### ***Problems, Issues and Opportunities Associated with Costs***

See City and County of Honolulu Sewage Summary for information

### ***Compare Visitor and Resident Impact***

In general, the residents generate the greatest portion of wastewater. The impact by visitors is limited. See City and County of Honolulu Sewage Summary for information.

### ***Major Assumptions***

See City and County of Honolulu Sewage Summary for information.

## **City and County of Honolulu – Ewa – Solid Waste Disposal**

### ***Present Capacity and Usage***

According to the *Ewa Development Plan* two major solid waste handling and disposal facilities are located in Ewa. The first, H-Power plant at Campbell Industrial Park is operating at maximum capacity and receives over **600,000 tons** of solid waste each year. The second, Waimanalo Gulch Sanitary Landfill is the major active waste disposal site on Oahu. The Waimanalo Gulch Sanitary Landfill is projected to run out of capacity within ten to twenty five years.<sup>94, 1997</sup>

### ***Existing Problems, Issues and Opportunities***

Sufficient landfill capacity is a major concern. See City and County of Honolulu Solid Waste Summary for information.

### ***Future and Planned Usage***

The *Ewa Development Plan* reports on the Solid Waste Integrated Management (SWIM) Plan prepared by the Department of public works and adopted by the City Council. In 1995 the SWIM identified existing landfills, which could be expanded and potential sites for developing new landfills to provide new capacity. The Waimanalo Gulch was identified as having potential for expansion. Ewa sites for new landfills identified in the Plan included the mauka part of Kahe Valley, a site within the West Loch Magazine Blast Zone, and a site in East Kapolei.<sup>94, 1997</sup>

### ***Future and Planned Requirements or Changes***

The following policies are noted in the *Ewa Development Plan*:

- The East Kapolei site identified in the SWIM Plan should not be developed as a landfill. It is in an area planned for residential use and is adjacent to the University of Hawaii West Oahu campus; and
- Siting and/or expansion of sanitary landfills should be analyzed and approved based on island wide studies and siting evaluations.<sup>94, 1997</sup>

### ***Anticipated Costs for the Future***

See City and County of Honolulu Solid Waste Summary for information.

### ***Problems, Issues and Opportunities Associated with Costs***

See City and County of Honolulu Solid Waste Summary for information.

### ***Compare Visitor and Resident Impact***

Both residents and visitors contribute to solid waste generation. Some of the visitor accommodations have developed creative ways to reduce the amount of

solid waste produced. See City and County of Honolulu Solid Waste Summary for information.

***Major Assumptions***

See City and County of Honolulu Solid Waste Summary for information.

## City and County of Honolulu – Ewa – Storm Water

### ***Present Capacity and Usage***

The *Ewa Development Plan* describes the storm water drainage in Ewa. Low-lying parts of the Ewa Plain are subject to flooding during intense rainstorms. Flood control has typically been provided for urbanized areas through the development of concrete-lined channels to convey storm waters to the ocean.

The City requires retention/detention facilities adequate for a two-year frequency/24-hour duration storm to be provided on site, but the required capacity is only for the amount of storm water generated on site. Undeveloped mountain areas generate a disproportionately large share of the total storm flow, and no party is responsible for mitigating the environmental impact.

The Kaloi Gulch Drainage Basin is one of the larger drainage basins in the region. It encompasses an area of approximately 7,140 acres, and has a peak design flow of approximately **11,500 cfs** (cubic feet per second). Historically, the drainage pattern in this basin has flowed from the Waianae mountain range above Makakilo through the Kaloi Gulch toward the ocean terminating on Haseko's Ewa Marina property.

The drainage plans for Phase I of the Ewa by Gentry East project call for a grass-lined drainage channel running immediately east of the project's boundary. The Ewa Villages and Ewa by Gentry projects are handling drainage within their projects through the development of golf courses.<sup>94, 1997</sup>

### ***Existing Problems, Issues and Opportunities***

The *Ewa Development Plan* notes that drainage flow through the Kaloi Gulch basin has been constrained by the elevation of the OR&L right-of-way, which forms a man-made barrier that impedes storm water runoff. The drainage system serving the Villages of Kapolei, which consists of golf course retention and disposal of storm water into injection wells and a large ditch near the Barbers Point Naval Air Station boundary, may need to be augmented in the future. Because of this constraint, storm water flows have been forced into a narrow drainage culvert between Tenney and Varona Villages in the Ewa Villages. During periods of heavy rainstorms, this has caused flooding in the Tenney and Varona Villages area.<sup>94, 1997</sup>

### ***Future and Planned Usage***

The *Ewa Development Plan* principles to guide the development of Ewa drainage systems include the following:

- Preserving natural gulches on the slopes of the Waianae Range foothills that are within the Urban Growth Boundary, as part of the open space network.

- Development of the Ewa Marina as a key element needed to mitigate drainage impacts in the Kaloι Gulch watershed during major storms.
- Solutions to handling drainage problems on lands above Ewa Villages must be compatible with the drainage design of the Ewa Villages Master Plan and other developments in the Kaloι Gulch drainage basin, which have already been approved.<sup>94, 1997</sup>

### ***Future and Planned Requirements or Changes***

The *Ewa Development Plan* notes drainage improvements are planned for:

- A major new system to drain Makaiwa Hills, Kapolei Business Park, and the industrial areas closest to the Barbers Point Deep Draft Harbor;
- Expansion of the channel at the western edge of BPNAS to provide additional capacity for the City of Kapolei;
- A system to drain the West Loch Drainage Basin, serving Ewa by Gentry and development in East Kapolei; and
- A system to drain the Kaloι Gulch Drainage Basin.
- The Makaiwa Hills system will have detention basins mauka of the H-1 Freeway and a 120-foot-wide concrete-lined channel to convey stormwater to an ocean outlet just south of Barbers Point Harbor. Campbell Estate is constructing the system and is also funding the expansion of the existing channel on the western boundary of the Barbers Point Naval Air Station.<sup>94, 1997</sup>

### ***Anticipated Costs for the Future***

Funding for storm water infrastructure associated with new development is the responsibility of the developer. See City and County of Honolulu Storm Water Summary for information.

### ***Problems, Issues and Opportunities Associated with Costs***

See City and County of Honolulu Storm Water Summary for information.

### ***Compare Visitor and Resident Impact***

See City and County of Honolulu Storm Water Summary for information.

### ***Major Assumptions***

See City and County of Honolulu Storm Water Summary for information.

## City and County of Honolulu – Ewa – Roads

### ***Present Capacity and Usage***

The *Ewa Development Plan* describes that roadway system in that region.

The major east-west arterials of the Ewa roadway system include:

- The H-1 Freeway which is the major arterial road connecting Ewa with the Primary Urban Center,
- Farrington Highway past Kapolei, is the major arterial connecting the Waianae Coast with Ewa, and, between Kapolei and Waipahu, is a secondary east-west route.

North-south roads distribute traffic onto and off of the east-west arterials at several locations. They include:

- Fort Weaver Road which links West Loch, Ewa Villages, Ewa by Gentry, and Ewa Beach with Farrington Highway and H-1,
- Kunia Road which connects to Central Oahu's Schofield Barracks and Wahiawa,
- Fort Barrette Road which runs south from Kapolei to the main entrance to Barbers Point Naval Air Station (BPNAS),
- Makakilo Drive which continues up the hillside from the Makakilo Interchange of the H-1 Freeway, providing the only access to Makakilo,
- Kalaeloa Boulevard which provides access to Campbell Industrial Park and Barbers Point Harbor via the H-1's Palailai Interchange.<sup>94, 1997</sup>

### ***Existing Problems, Issues and Opportunities***

According to the *2020 Oahu Regional Transportation Plan* the existing transportation system in Ewa has sufficient capacity for current traffic volumes during peak hour traffic, but experiences congested conditions because of bottlenecks and lack of capacity on the corridor from Pearl City to Downtown Honolulu.

The planned development of East Kapolei and the return of Barbers Point Naval Air Station to civilian use will open additional areas for use and increase transportation needs beyond the levels planned for in the *2020 Oahu Regional Transportation Plan*.

### ***Future and Planned Usage***

The *Ewa Development Plan* reports that the substantial development of Secondary Urban Center jobs (from 17,000 jobs in 1990 to over 64,000 jobs by 2020) is projected to increase the number of Ewa residents who work in the area. However, it is also projected that the number of commuters traveling to the PUC from Ewa and Central Oahu will still increase, although at a lower rate than would occur if development of the Secondary Urban Center was not supported.<sup>94, 1997</sup>

There is a need for additional streets and highways to accommodate the additional growth expected.

See City and County of Honolulu Roads Summary for information on road improvements.

### ***Future and Planned Requirements or Changes***

**Table 2.42 -- Ewa Roadway Network: 1997**

| <u>Planned Extensions</u>   | <u>ORTP #</u> | <u>ORTP Phasing</u> |
|---|---------------|---------------------|
| <b>Existing Roads Improvements</b>  |               |                     |
| • Widen Farrington Hwy (4 lanes, Ft. Weaver to Kalaeloa)                                  | C2            | 1995-2000           |
| • Widen Ft. Barrette Road (4 lanes, H-1 to Kapolei Pkway)                                 | S10           | 1995-2000           |
| • Widen Ft. Weaver Road/Kunia Road (6 lanes, H-1 to Renton Road)                          | S20           | 2001-2005           |
| • Widen Kalaeloa Boulevard/Extend Hanua Street to H-1                                     | S21           | 2001-2005           |
| • Widen Farrington Hwy (6 lanes, H-1 terminus to Nanakuli)                                | S31           | 2006-2020           |
| • HOV median lane from Makakilo to Waiawa Interchange                                     | HOV-7         | 2006-2020           |
| <b>New Roads</b>  |               |                     |
| • Kapolei Parkway   | C5            | 1995-2000           |
| • North-South Road  | S19           | 2001-2005           |
| <b>Interchange Improvements</b>   |               |                     |
| • Kunia Interchange   | S1            | 1995-2000           |
| • Makakilo Interchange  | S2            | 1995-2000           |
| • Palailai Interchange  | S17           | 2001-2005           |
| <b>New Interchanges</b>   |               |                     |
| • Kapolei Interchange   | S27           | 1995-2000           |
| • North-South Road Interchange  | S19           | 2001-2005           |
| • Makaiwa Hills   | S32           | 2006-2020           |
| <b>Additional Elements</b>  |               |                     |
| • Link Fort Barrette Rd. and Kalaeloa Regional Park (BPNAS)                               |               |                     |
| • Extend from North-South Rd. into Kalaeloa Regional Park                                 |               |                     |
| • Develop additional north-south roads and a mauka frontage road near the City of Kapolei |               |                     |
| • Extend Geiger Road to link Fort Barrette Road and North-South Road                      |               |                     |
| • Link Campbell Industrial Park with Geiger Road  |               |                     |
| • Develop an additional north-south road in East Kapolei                                  |               |                     |

Source: *Ewa Development Plan*

### ***Anticipated Costs for the Future***

See City and County of Honolulu Roads Summary for information.

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### ***Problems, Issues and Opportunities Associated with Costs***

The *Ewa Development Plan* states that under existing Unilateral Agreements, Ewa developers and landowners have agreed to finance their fair share of development of the roads.<sup>94, 1997</sup>

### ***Compare Visitor and Resident Impact***

See City and County of Honolulu Roads Summary for information.

### ***Major Assumptions***

Traffic volume on the H-1 at Waikele is projected to increase by over 60% by 2020, while traffic on the H-1 by Aiea is projected to increase by 10%.<sup>94, 1997</sup>

## City and County of Honolulu – Ewa – Airports

### ***Present Capacity and Usage***

The *Final Statewide Airport System Plan* describes planned requirements for one the secondary airports on Oahu, Kalaeloa Airport (formerly Barbers Point Naval Air Station).<sup>127, 1998</sup>

**Table 2.43 – Aircraft operations at Barbers Point: 2001**

| <b>Airport</b> | <b>Total operations</b> | <b>Air carrier</b> | <b>Air taxi</b> | <b>General aviation</b> | <b>Military</b> |
|----------------|-------------------------|--------------------|-----------------|-------------------------|-----------------|
| Kalaeloa       | 183,600                 | -                  | 264             | 159,631                 | 23,705          |

Source: 2001 State Of Hawaii Data Book

### ***Existing Problems, Issues and Opportunities***

See City and County of Honolulu Airports Summary for information.

### ***Future and Planned Usage***

See City and County of Honolulu Airports Summary for information.

### ***Future and Planned Requirements or Changes***

The Kalaeloa Airport is expected to function as a general aviation facility. General aviation users at Honolulu International Airport will be encouraged to relocate to Kalaeloa. Facilities anticipated include: hanger space, aircraft parking, tie downs, and operations space for fixed base operators.

#### Kalaeloa Airport

The five major programs planned for the Kalaeloa Airport are:

- Utility Improvements
- Perimeter Road & Fencing Improvements
- NAVAIDs Improvements
- Airfield Improvements
- Passenger Terminal Improvements
- Kalaeloa Lighting & Marki Change<sup>127, 1998</sup>

### ***Anticipated Costs for the Future***

The *Final Statewide Airport System Plan* identified the following major program:

#### Kalaeloa Airport

There are five major programs slated for the Kalaeloa Airport. The total program costs amount to \$2.87 million.<sup>127, 1998</sup>

### ***Problems, Issues and Opportunities Associated with Costs***

See City and County of Honolulu Airports Summary for information.

***Compare Visitor and Resident Impact***

See Visitor Accommodations and City and County of Honolulu Airports Summary for information.

***Major Assumptions***

See City and County of Honolulu Airports Summary for information.

## City and County of Honolulu – Ewa – Harbors

### ***Present Capacity and Usage***

Analysis of county documents shows that a 250 slip marina was opened at the Ko Olina Resort development in 2000. The recreational marina contains slips, a boat launch ramp and fuel dock. Access is through the Barber Point commercial harbor channel. The marina is privately owned and operated.

**Table 2.44 – Barbers Point Statistics**

| Island and harbor | Harbor entrance depth (feet) | Depth (feet) | Length (feet) | Width (feet) | Piers (linear feet) | Shedded | Open  |
|-------------------|------------------------------|--------------|---------------|--------------|---------------------|---------|-------|
| Barbers Point     | 42                           | 38           | 2,100         | 1,800        | 2,190               | 36      | 1,703 |

Source: 2001 State of Hawaii Data Book

The *Ewa Development Plan* describes the private Ewa Marina project.<sup>94, 1997</sup>

### ***Existing Problems, Issues and Opportunities***

Due to a lack of information further study is recommended.

### ***Future and Planned Usage***

The *Ewa Development Plan* discusses the role of Ewa Marina as a key element needed to mitigate drainage impacts in the Kaloι Gulch watershed during major storms. The marina's role as a storm water storage and detention basin has been acknowledged and included in previously approved environmental impact statements and land use approvals for projects in the Kaloι Gulch watershed.<sup>94, 1997</sup>

### ***Future and Planned Requirements or Changes***

State Airports, Harbors and Highways lists future changes as follows:

Kalaeloa/Barbers Point

Perimeter lighting and construction of a control tower on Pier P-4 peninsula.

Dredging and flaring of the harbor's entrance channel and construction of a jetty to attenuate cross-currents.

Dredging the turning basin to -45 feet to accommodate deeper draft vessels.

A triangular section of land is targeted for dredging to form a 90 degree corner between Pier P-4 and Pier P-5.

A 300-foot seaward extension of Pier P-5.

Harbor expansion approximately 1,100 feet by 1,100 feet along the northeast margin.

Construction of Pier P-7 for bulk cargo.

A dedicated petroleum dock is proposed at Pier P-4.

Relocation of dry dock operation to the northwest area of the expansion project.

A joint/cooperative boat repair and maintenance facility in the expansion area.<sup>37, 2001</sup>

### ***Anticipated Costs for the Future***

Analysis of county documents shows that the Ewa Marina is privately owned and developed. Information on future costs was not available from county documents.

State Airports, Harbors and Highways lists anticipated cost of future changes as follows:

- Kalaeloa/Barbers Point
- Construction of Pier P-5 \$5 million.
- Navigation lights along the northwestern margin of the harbor \$406,000.
- Project design Pier P-7 \$17 million.
- Internal Access Road improvements \$400,000.
- Special maintenance projects \$73,000.<sup>37, 2001</sup>

### ***Problems, Issues and Opportunities Associated with Costs***

Analysis of county documents shows that the Ewa Marina is privately owned and developed. Information on problems, issues and opportunities with future costs was not available from county documents.

### ***Compare Visitor and Resident Impact***

Analysis of county documents shows that commercial snorkeling and sightseeing tours are operated out of the Ko Olina Marina.

### ***Major Assumptions***

See City and County of Honolulu Harbors Summary for information.

## City and County of Honolulu – Ewa – Parks

### ***Present Capacity and Usage***

The *Ewa Development Plan* describes parks in the region. Regional parks and recreation complexes include the Kalaeloa Regional Park and Recreation Complex proposed for Barbers Point Naval Air Station, Kapolei Regional Park, Puu Palailai Park, various beach and shoreline parks, and public and private golf courses. Existing beach and shoreline parks are located at Tracks, Kahe Point, Barbers Point, Oneula, Ewa Beach, and West Loch. <sup>94, 1997</sup>

**Table 2.45 – Oahu Parks**

| <b>Regional Parks and Recreation Complexes</b>    | <b>Beach and Shoreline Parks</b> | <b>Golf Courses</b>   |
|---|----------------------------------|---|
| Kalaeloa Regional Park                            | Tracks                           | City  |
| Kapolei Regional Park                             | Kahe Point                       | West Loch   |
| Puu Palailai Park                                 | Barbers Point                    | Ewa Villages  |
| Recreation Park for Barbers Pt. Naval Air Station | Oheula                           | Currently seven with plans to construct five additional courses |
|   | Ewa Beach                        |   |
|   | West Loch                        |   |

Source: *Ewa Development Plan*

### ***Existing Problems, Issues and Opportunities***

The Ewa region currently has insufficient community-based park area based upon the island-wide standard outlined by the Department of Parks and Recreation. The existing community park deficit relative to the standard is almost 40 acres.

The *Ewa Development Plan* recommends that new residential development should strive to provide land for open space and recreation purposes at a minimum of two acres of park per 1,000 residents. Based on the standards, an additional 76 acres of community-based parks and recreation areas should be developed to meet the needs of the projected 2020 Ewa population. <sup>94, 1997</sup>

### ***Future and Planned Usage***

The *Ewa Development Plan* states that based on DPR standards, an additional 76 acres of community-based parks and recreation areas should be developed to meet the needs of the projected 2020 Ewa population.

Sports and recreation complexes designed to attract visitors from throughout the region and the rest of Oahu have been proposed for a number of areas in Ewa. Proposals for a Kalaeloa Center on surplus lands at Barbers Point Naval Air

Station call for creation of an "Olympic Village" type international training center, a baseball training facility, a rowing water course, a motorsports center, and a water theme park.

Kapolei Regional Park is a 73-acre park. The park will provide diverse active and passive recreation within easy walking distance of both the City Center and the Villages of Kapolei.

Two future beach parks are planned at both ends of Ko Olina. The larger park at the northern end of the resort will provide for picnicking and other passive recreation. A park at the southern end will provide direct access to one of the four swimming lagoons. A boat-launching ramp, which will be available for public use, will be located adjacent to the southern park, and will provide access to the marina channel.

Puu Palailai Park will be located below Makakilo, and is to be a nature park.<sup>94, 1997</sup>

### ***Future and Planned Requirements or Changes***

The *Ewa Development Plan* notes future and planned changes for the region's parks system. The new Kalaeloa Regional Park at the present Barbers Point Naval Air Station will feature a large shoreline park with beach recreation and support facilities. Key elements of the Park are as follows:

- The Park will include and preserve two wetland areas and an endangered plant preserve that have been recommended for preservation by the U.S. Fish and Wildlife Service.
- Proposed uses for the mauka areas include a Hawaiian cultural park, continuation of the existing riding stable, cabin and tent camping, archery, and various other passive and active recreations uses. The site could also accommodate a baseball complex.
- The Park will also provide access to a continuous shoreline easement extending from the Ewa Marina development to Ko Olina

#### Islandwide and Regional Parks

- Other beach and shoreline parks should be located throughout the Ewa coastline. Planned beach parks include one at either end of the Ko Olina shoreline. Oneula Beach Park will be expanded as part of the Ewa Marina project.
- Sites for regional parks at Puu Kapolei and Puu Palailai include prominent landforms that should be maintained as a natural visual feature and regional landmark.<sup>94, 1997</sup>

### ***Anticipated Costs for the Future***

The Vision Projects FY2002 anticipated future costs for the island of Oahu as:

- Asing Park Improvement:  
Project budget: \$300,000

- Kapolei Regional Park Improvements:  
Project budget: \$745,000<sup>155, 2002</sup>

***Problems, Issues and Opportunities Associated with Costs***

Developers set aside land for recreation. See City and County of Honolulu Parks Summary for information.

***Compare Visitor and Resident Impact***

See City and County of Honolulu Parks Summary for information.

***Major Assumptions***

See City and County of Honolulu Parks Summary for information.

## **City and County of Honolulu – Ewa – Police, Fire and Emergency Services**

### ***Present Capacity and Usage***

*The Honolulu Police Department 2000 Annual Report* describes the police districts. District 8 encompasses the Waianae Coast, Makakilo, Ewa Plain, and City of Kapolei.<sup>53, 2000</sup>

The Finance Division of the Police Department reports that Police Districts and Planning Districts are not the same. Honolulu's police district is divided into smaller units than the planning district, while outlying areas are consolidated under larger districts.<sup>165, 2002</sup>

According to the *Ewa Development Plan*, there are currently **three** fire stations and one police station in the Ewa Development Plan Area.<sup>94, 1997</sup>

### ***Existing Problems, Issues and Opportunities***

According to the *Ewa Development Plan*, adequate staffing and facilities are needed to ensure public safety. New development should be approved only if staffing and facilities will be adequate to provide fire and police protection when development is completed.<sup>94, 1997</sup>

### ***Future and Planned Usage***

According to the *Ewa Development Plan*, to meet projected population and economic growth by 2020, the Fire Department estimates Ewa will need four new fire stations.<sup>94, 1997</sup>

### ***Future and Planned Requirements or Changes***

The *Ewa Development Plan* states that police personnel operate primarily in the field and therefore need a limited number of substations. Based on this premise only one new regional station has been planned by the Police Department to serve the 2020 population of 125,000. The proposed facility is to be built in the City of Kapolei on donated land.<sup>94, 1997</sup>

### ***Anticipated Costs for the Future***

See City and County of Honolulu Police, Fire and Emergency Medical Services Summary for information.

### ***Problems, Issues and Opportunities Associated with Costs***

See City and County of Honolulu Police, Fire and Emergency Medical Services Summary for information.

***Compare Visitor and Resident Impact***

See City and County of Honolulu Police, Fire and Emergency Medical Services Summary for information.

***Major Assumptions***

See City and County of Honolulu Police, Fire and Emergency Medical Services Summary for information.

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## **City and County of Honolulu – Ewa – Visitor Accommodations**

### ***Present Capacity and Usage***

Analysis of county documents shows that there is one major visitor accommodation in the Ewa at the Ko Olina Resort. Other accommodations are limited to bed and breakfast and vacation rentals units that are unregulated and unaccounted for.

According to the *2001 Visitor Plant Inventory*, there are 2 apartment/hotel properties, 1 B&B, 2 condo hotels, 1 hotel, 5 vacation rental and 1 other property. This accounts for the 947 units in the Leeward Makaha area.

### ***Existing Problems, Issues and Opportunities***

Analysis of county documents shows that development of resorts outside of the Waikiki area has not meet with previous projects or expectations.

### ***Future and Planned Usage***

Analysis of county documents shows that significant resort and community development is projected for the Ewa region.

### ***Future and Planned Requirements or Changes***

There are 33 planned timeshare units for the Makaha / Leeward area, according to the *2001 Visitor Plant Inventory*.

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – Ewa – Private Transportation**

### ***Present Capacity and Usage***

No documentation was uncovered regarding private transportation at the community level. Therefore, no evaluation was made.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – Ewa – Energy Systems**

### ***Present Capacity and Usage***

No documentation was uncovered regarding energy systems at the community level. Therefore, no evaluation was made. See City and County of Honolulu Energy Systems summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – Ewa – Sewer Systems**

### ***Present Capacity and Usage***

There was little to distinguish private sewer systems from public sewage at the community level. See City and County of Honolulu Sewage summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – Ewa – Coastal Water Quality**

### ***Present Capacity and Usage***

There was little documentation for coastal water quality at the community level. See State of Hawaii Coastal Water Quality summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – Ewa – Marine Ecosystem Health**

### ***Present Capacity and Usage***

There was little documentation for marine ecosystem health at the community level. See State of Hawaii Marine Ecosystem Health summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – Ewa – Forestry / Green Space**

### ***Present Capacity and Usage***

There was little documentation for forestry / green space at the community level. See State of Hawaii Forestry / Green Space summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – Ewa – Air Quality**

### ***Present Capacity and Usage***

There was little documentation for air quality at the community level. See State of Hawaii Air Quality summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – Ewa – Beach Erosion**

### ***Present Capacity and Usage***

There was little documentation for beach erosion at the community level. See State of Hawaii Beach Erosion summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – Ewa – Invasive Species**

### ***Present Capacity and Usage***

There was little documentation for invasive species at the community level. See State of Hawaii Invasive Species summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – Ewa – Other Natural / Scenic Resources**

### ***Present Capacity and Usage***

There was little documentation for riparian / wetlands, native species or other natural / scenic resources at the community level. See State of Hawaii Natural / Scenic Resources summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

## **City and County of Honolulu – Waianae – Water Quality and Quantity**

### ***Present Capacity and Usage***

*The General Plan: City and County of Honolulu* describes the water system as Makaha shaft (6 wells), Waianae Valley (3 wells), Waianae Tunnel and the Plantation Tunnel. Potable water is also imported from Pearl Harbor. The capacity of this system is 7.8mgd. In 1996, the actual draw on potable water sources was 4.337mgd. The sustainable yield of the Makaha aquifer is set at 4mgd and the Waianae aquifer is 3mgd. The 5-year average draw on the two aquifers is 4.5mgd. <sup>28, 1992</sup>

Development in the area will need more potable water. Pearl Harbor sources are being tapped. **A per capita demand of 240gpd is anticipated.**

### ***Existing Problems, Issues and Opportunities***

*The General Plan: City and County of Honolulu* lists the following existing issues:

- Proposed golf course in Waianae must find own water sources.
- More available water due to decreased water demand from agriculture, but not enough to accommodate all of the planned growth. <sup>28, 1992</sup>

### ***Future and Planned Usage***

*The General Plan: City and County of Honolulu* notes two new water storage reservoirs are planned in Makaha and Nanakuli with storage capacity of 2 million gallons each. <sup>28, 1992</sup>

### ***Future and Planned Requirements or Changes***

See City and County of Honolulu Water Summary for information.

### ***Anticipated Costs for the Future***

See City and County of Honolulu Water Summary for information.

### ***Problems, Issues and Opportunities Associated with Costs***

See City and County of Honolulu Water Summary for information.

### ***Compare Visitor and Resident Impact***

See City and County of Honolulu Water Summary for information.

### ***Major Assumptions***

See City and County of Honolulu Introduction and Water Summaries for information.

## **City and County of Honolulu – Waianae – Sewage**

### ***Present Capacity and Usage***

According to the *General Plan: City and County of Honolulu* the Waianae Wastewater Treatment Plant serves the Waianae region. The treatment plant processes an average flow of **3.2 million gallons per day** (mgd) and is operating below its total capacity, which is **5.0mgd**.<sup>28, 1992</sup>

### ***Existing Problems, Issues and Opportunities***

Problems for the Waianae region as outlined in the *General Plan: City and County of Honolulu* include:

- The Waianae Wastewater Treatment Plant is not provided with landscaping to make the facility more aesthetically appealing;
- Approximately 20% of the homes (1,180 people) are not connected to the centralized wastewater collection system;
- Sewer odor and formation of hydrogen sulfide gas is occurring in some of the sewer lines. Odors and gas formation are caused by extended retention times in the sewer lines; and
- Some of the sewer service and transmission lines are in need of repair or replacement.<sup>28, 1992</sup>

### ***Future and Planned Usage***

As stated in the *General Plan: City and County of Honolulu* plans for the Waianae Wastewater Treatment Plant include:

- Aesthetic modifications to the facility's landscaping;
- Implementation of a plan to minimize odors; and
- The design and implementation of a plan to connect lower income families to the centralized wastewater collection system.<sup>28, 1992</sup>

### ***Future and Planned Requirements or Changes***

See City and County of Honolulu Sewage Summary for information.

### ***Anticipated Costs for the Future***

See City and County of Honolulu Sewage Summary for information.

### ***Problems, Issues and Opportunities Associated with Costs***

See City and County of Honolulu Sewage Summary for information.

### ***Compare Visitor and Resident Impact***

In general, the residents generate the greatest portion of wastewater. The impact by visitors on wastewater generation is limited. See City and County of Honolulu Sewage Summary for information.

### ***Major Assumptions***

See City and County of Honolulu Sewage Summary for information.

## **City and County of Honolulu – Waianae – Solid Waste Disposal**

### ***Present Capacity and Usage***

The *General Plan: City and County of Honolulu* reports that the City's Refuse Division provides solid waste collection for the Waianae region. Disposal of the solid waste is split between the Waimanalo Gulch Sanitary Landfill and the H-POWER waste to energy facility. A portion of the solid waste is disposed of at a privately owned facility, PVT Nanakuli Construction and Demolition Material Landfill. This landfill manages approximately 20 percent of Oahu's solid waste.  
28, 1992

### ***Existing Problems, Issues and Opportunities***

The following problems are outlined in the *General Plan: City and County of Honolulu*:

- The landfill has a limited disposal capacity;
- The district does not currently have a mandatory recycling plan of both commercial and industrial wastes; and
- Individuals who are illegally dumping solid waste are not being prosecuted.  
28, 1992

### ***Future and Planned Usage***

See City and County of Honolulu Solid Waste Summary for information.

### ***Future and Planned Requirements or Changes***

See City and County of Honolulu Solid Waste Summary for information.

### ***Anticipated Costs for the Future***

See City and County of Honolulu Solid Waste Summary for information.

### ***Problems, Issues and Opportunities Associated with Costs***

See City and County of Honolulu Solid Waste Summary for information.

### ***Compare Visitor and Resident Impact***

See City and County of Honolulu Solid Waste Summary for information.

### ***Major Assumptions***

See City and County of Honolulu Solid Waste Summary for information.

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## **City and County of Honolulu – Waianae – Storm Water**

### ***Present Capacity and Usage***

The *General Plan: City and County of Honolulu* describes the storm water drainage system in Waianae region as having no perennial streams. Rainfall averages less than 20 inches a year. Rainfall is occasionally heavy during Kona storms. Four drainage channels are in place to collect storm water runoff.<sup>28, 1992</sup>

### ***Existing Problems, Issues and Opportunities***

The *General Plan: City and County of Honolulu* states that the region suffers from localized flooding due to inadequate drainage in new subdivisions.<sup>28, 1992</sup>

### ***Future and Planned Usage***

See City and County of Honolulu Storm Water Summary for information.

### ***Future and Planned Requirements or Changes***

The *General Plan: City and County of Honolulu* lists planned changes as follows:

- Need to establish a sediment control program to protect and manage stream quality.
- Project for drain line on Lahina Street.
- Study for drainage improvement on Hakimo Road.<sup>28, 1992</sup>

### ***Anticipated Costs for the Future***

See City and County of Honolulu Storm Water Summary for information.

### ***Problems, Issues and Opportunities Associated with Costs***

The *General Plan: City and County of Honolulu* states that funding for comprehensive study of local drainage problems in Waianae is high and there is a need to find alternative means of funding.<sup>28, 1992</sup>

### ***Compare Visitor and Resident Impact***

See City and County of Honolulu Storm Water Summary for information.

### ***Major Assumptions***

See City and County of Honolulu Introduction Storm Water Summaries for information.

## **City and County of Honolulu – Waianae – Roads**

### ***Present Capacity and Usage***

The *General Plan: City and County of Honolulu* describes the main road in Waianae district is Farrington Highway.<sup>28, 1992</sup>

### ***Existing Problems, Issues and Opportunities***

The existing issues noted in the *General Plan: City and County of Honolulu* include:

- Traffic congestion due to increase population within Kapolei;
- An emergency access road;
- A safe bicycle route along Farrington Highway;
- A way to maintain the rural setting while trying to build the necessary infrastructure to accommodate the traffic flow; and
- A way to generate more local jobs.<sup>28, 1992</sup>

### ***Future and Planned Usage***

The planned usage section of the *General Plan: City and County of Honolulu* identifies the need to enhance the existing public transportation system by having more express bus routes service the region.<sup>28, 1992</sup>

### ***Future and Planned Requirements or Changes***

The *General Plan: City and County of Honolulu* lists construction of a “Mauka Road” or “Mauka Highway as a solution to congestion.”<sup>28, 1992</sup>

### ***Anticipated Costs for the Future***

See City and County of Honolulu Roads Summary for information.

### ***Problems, Issues and Opportunities Associated with Costs***

See City and County of Honolulu Roads Summary for information.

### ***Compare Visitor and Resident Impact***

See City and County of Honolulu Roads Summary for information.

### ***Major Assumptions***

See City and County of Honolulu Introduction and Roads Summaries for information.

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## **City and County of Honolulu – Waianae – Airports**

### ***Present Capacity and Usage***

Analysis of county documents shows that there are no airports in Waianae region.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – Waianae – Harbors**

### ***Present Capacity and Usage***

Analysis of county documents shows there are no commercial harbors in the Waianae region. The Waianae Small Boat Harbor is operated by the Department of Land and Natural Resources Division of Boating and Outdoor Recreation.

According to DOBOR, the following facilities are available at the Waianae Small Boat Harbor.

- 38.4 acres
- 109 berths
- 7 ramps
- 1 pier/loading ramp
- harbor office, restrooms and
- ice house/convenience store.

### ***Existing Problems, Issues and Opportunities***

See City and County of Honolulu Harbors Summary for information.

### ***Future and Planned Usage***

See City and County of Honolulu Harbors Summary for information.

### ***Future and Planned Requirements or Changes***

See City and County of Honolulu Harbors Summary for information.

### ***Anticipated Costs for the Future***

See City and County of Honolulu Harbors Summary for information.

### ***Problems, Issues and Opportunities Associated with Costs***

See City and County of Honolulu Harbors Summary for information.

### ***Compare Visitor and Resident Impact***

The major impact at the Waianae Small Boat Harbor is from area residents who utilize the facility for mooring and launching of small fishing boats. The visitor impact is nominal.

### ***Major Assumptions***

See City and County of Honolulu Harbors Summary for information.

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## **City and County of Honolulu – Waianae – Parks**

### ***Present Capacity and Usage***

The *State Parks of the Island of Oahu* describes Kaena Point State Park as follows: The park provides a relatively remote coastline with picnicking opportunities, shore fishing, a large sandy beach at Keawaula Bay with board surfing, and lifeguard services. There is also hiking (2.7 miles along volcanic coast with tide pools, small natural stone arches and fine views of Makua coastline.) and early morning porpoise sightings from the point near Kauakauila stream mouth. The facility is approximately 778.6 acres.<sup>131, 2002</sup>

### ***Existing Problems, Issues and Opportunities***

See City and County of Honolulu Parks Summary for information.

### ***Future and Planned Usage***

See City and County of Honolulu Parks Summary for information.

### ***Future and Planned Requirements or Changes***

See City and County of Honolulu Parks Summary for information.

### ***Anticipated Costs for the Future***

See City and County of Honolulu Parks Summary for information.

### ***Problems, Issues and Opportunities Associated with Costs***

See City and County of Honolulu Parks Summary for information.

### ***Compare Visitor and Resident Impact***

See City and County of Honolulu Parks Summary for information.

### ***Major Assumptions***

See City and County of Honolulu Introduction and Parks Summaries for information.

## City and County of Honolulu – Waianae – Police, Fire and Emergency Services

### ***Present Capacity and Usage***

According to the *Waianae Sustainable Communities Plan*, the HPD provides service to the Waianae District through the Waianae Police Station and the Barbers Point substation. There are normally **14 to 17 police officers** on duty to service this area. The Waianae Police Station handles a large number of 911 calls and a large number of arrests, with a monthly average of about **5,000 to 6,000 911 calls and 500 to 600 arrests**.

The HFD has two fire stations in the Waianae District. The Nanakuli Fire Station has a **5-person engine, a 1-person tanker and an inflatable rescue boat**. The Waianae Fire Station has a **5-person engine, a 1-person tanker, and a 5-person quint** used as a combination pumper and ladder truck. Emergency ambulance service is also provided out of the Waianae Fire Station with one unit. The HFD is provided backup service by stations located in Kapolei, Makakilo, Ewa, and Waipahu.

Emergency service for Kaiser Permanente is provided from the Moanalua center with ambulance service provided by the Leeward clinic in Waipahu. The nearest hospital is the Saint Francis West Hospital located in Waipahu. For severe cases, a helicopter is dispatched to the Waianae coast and the patients are taken to Queen's Medical Center.<sup>97, 2000</sup>

See Ewa Police, Fire and Emergency Medical Services Summary for information. The police districts and planning districts are not the same.

### ***Existing Problems, Issues and Opportunities***

According to the *Waianae Sustainable Communities Plan*, too many public buildings on Oahu, including police stations, fire stations, and schools, have been designed with insufficient attention to sound design principles. There needs to be an assessment for new health care facilities, including possibly a full-service hospital. Then, proceed with planning and funding of new health care facilities as appropriate.

There are not enough police officers to handle the substantial need for police services. The Waianae District firefighters are called upon to respond to a large number of brushfires each year, especially during the dry summer months. There is also a need for a second ambulance.<sup>97, 2000</sup>

### ***Future and Planned Usage***

See City and County of Honolulu and Ewa Police, Fire and Emergency Medical Services Summaries for information.

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### ***Future and Planned Requirements or Changes***

See City and County of Honolulu and Ewa Police, Fire and Emergency Medical Services Summaries for information.

### ***Anticipated Costs for the Future***

See City and County of Honolulu and Ewa Police, Fire and Emergency Medical Services Summaries for information.

### ***Problems, Issues and Opportunities Associated with Costs***

See City and County of Honolulu and Ewa Police, Fire and Emergency Medical Services Summaries for information.

### ***Compare Visitor and Resident Impact***

See City and County of Honolulu and Ewa Police, Fire and Emergency Medical Services Summaries for information.

### ***Major Assumptions***

See City and County of Honolulu Introduction and Ewa Police, Fire and Emergency Medical Services Summaries for information.

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## **City and County of Honolulu – Waianae – Visitor Accommodations**

### ***Present Capacity and Usage***

Analysis of county documents shows that there are few major visitor accommodations in the Waianae. Accommodations are limited to Bed and Breakfast and vacation rentals units that are unregulated and unaccounted for.

More details regarding number of properties can be found in the Ewa Visitor Accommodations Summary. The information was combined at the source (2001 *Visitor Plant Inventory*).

### ***Existing Problems, Issues and Opportunities***

Analysis of county documents shows that Bed and Breakfast and vacation rentals are unregulated.

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – Waianae – Private Transportation**

### ***Present Capacity and Usage***

No documentation was uncovered regarding private transportation at the community level. Therefore, no evaluation was made.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – Waianae – Energy Systems**

### ***Present Capacity and Usage***

No documentation was uncovered regarding energy systems at the community level. Therefore, no evaluation was made. See City and County of Honolulu Energy Systems summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – Waianae – Sewer Systems**

### ***Present Capacity and Usage***

There was little to distinguish private sewer systems from public sewage at the community level. See City and County of Honolulu Sewage summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – Waianae – Coastal Water Quality**

### ***Present Capacity and Usage***

There was little documentation for coastal water quality at the community level. See State of Hawaii Coastal Water Quality summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – Waianae – Marine Ecosystem Health**

### ***Present Capacity and Usage***

There was little documentation for marine ecosystem health at the community level. See State of Hawaii Marine Ecosystem Health summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – Waianae – Forestry / Green Space**

### ***Present Capacity and Usage***

There was little documentation for forestry / green space at the community level. See State of Hawaii Forestry / Green Space summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – Waianae – Air Quality**

### ***Present Capacity and Usage***

There was little documentation for air quality at the community level. See State of Hawaii Air Quality summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – Waianae – Beach Erosion**

### ***Present Capacity and Usage***

There was little documentation for beach erosion at the community level. See State of Hawaii Beach Erosion summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – Waianae – Invasive Species**

### ***Present Capacity and Usage***

There was little documentation for invasive species at the community level. See State of Hawaii Invasive Species summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – Waianae – Other Natural / Scenic Resources**

### ***Present Capacity and Usage***

There was little documentation for riparian / wetlands, native species or other natural / scenic resources at the community level. See State of Hawaii Natural / Scenic Resources summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

## City and County of Honolulu – North Shore – Water Quality and Quantity

### ***Present Capacity and Usage***

The *General Plan: City and County of Honolulu* states North Shore water is supplied primarily by the Board of Water Supply. Current usage is approximately **2.7 million gallons per day** (mgd) and supply is more than adequate to meet demand.<sup>28, 1992</sup>

### ***Existing Problems, Issues and Opportunities***

The *General Plan: City and County of Honolulu* notes there is surplus water due to the closing of the Wailua Sugar Mill<sup>28, 1992</sup>

### ***Future and Planned Usage***

The *General Plan: City and County of Honolulu* reports water demand in the North Shore area for 1996 was approximately **2.7mgd**. It was projected that water demand for the area would increase to about 3.0mgd by the year 2000 and 3.7mgd by 2020. The demand projections were based on the City and County population estimates for the year 2020.

Guiding principles and policies regarding water are:

- Protect and preserve the streams, wetlands' natural drainage systems, watershed areas and the shoreline and coastal areas.
- Integrate management of all potable and non-potable water sources, including groundwater, surface water, storm water, and reclaimed water.
- Encourage use of non-potable water for irrigation of landscaping and agricultural lands to conserve supply of potable water.
- Protect and manage the water resources that support wetland farming (taro and lotus root) to ensure sufficient quantity and quality.
- Surplus water for wetland farming<sup>28, 1992</sup>

### ***Future and Planned Requirements or Changes***

The *General Plan: City and County of Honolulu* lists BWS planned changes that are included in the BWS's six-year capital improvement program (CIP) for FY 1998 to FY 2003.

- A proposed 16" water main along Kamehameha Highway from Pupukea to Sunset Beach;
- Proposed wells at Mokeuleia and Kawaihapai; and
- The installation of granulated activated carbon contact tanks to improve the water quality of the Haleiwa and Waiialua systems by removing trace amounts of pesticides from the water.<sup>28, 1992</sup>

***Anticipated Costs for the Future***

See City and County of Honolulu Water Summary for information.

***Problems, Issues and Opportunities Associated with Costs***

See City and County of Honolulu Water Summary for information.

***Compare Visitor and Resident Impact***

See City and County of Honolulu Water Summary for information.

***Major Assumptions***

See City and County of Honolulu Introduction and Water Summaries for information.

## **City and County of Honolulu – North Shore – Sewage**

### ***Present Capacity and Usage***

As stated in the *General Plan: City and County of Honolulu*, 1992 the North Shore is served primarily by on-site cesspools and septic systems. A portion of the region's apartments utilizes private treatment plants with effluent injection wells.<sup>28, 1992</sup>

### ***Existing Problems, Issues and Opportunities***

Problems for the North Shore community as outlined in the *General Plan: City and County of Honolulu* include:

- Approximately 40% of the cesspools have failed in the Waialua – Haleiwa area;
- The cesspools allow essentially untreated waste to enter the ground water and ultimately the ocean; and
- Sewage related health problems due to heavy recreational use of the beaches have been noted.<sup>28, 1992</sup>

### ***Future and Planned Usage***

In accordance with the *General Plan: City and County of Honolulu*, homeowners could be required to have a privately owned wastewater injection well as part of their on-site wastewater treatment system.<sup>28, 1992</sup>

### ***Future and Planned Requirements or Changes***

See City and County of Honolulu Sewage Summary for information.

### ***Anticipated Costs for the Future***

It is stated in the *General Plan: City and County of Honolulu*, that acquisition of land for future injection well sites will be difficult and costly.<sup>28, 1992</sup>

### ***Problems, Issues and Opportunities Associated with Costs***

See City and County of Honolulu Sewage Summary for information.

### ***Compare Visitor and Resident Impact***

See City and County of Honolulu Sewage Summary for information.

### ***Major Assumptions***

See City and County of Honolulu Introduction and Sewage Summaries for information.

## **City and County of Honolulu – North Shore – Solid Waste Disposal**

### ***Present Capacity and Usage***

The *General Plan: City and County of Honolulu* states the solid waste transfer facility at Kawaihoa is utilized for disposal of solid waste.<sup>28, 1992</sup>

### ***Existing Problems, Issues and Opportunities***

The following problems are outlined in the *General Plan: City and County of Honolulu*:

- Illegal dumping and abandon vehicles on agricultural lands and vacant lots is a chronic problem; and
- There is a shortage of regular maintenance crews to pick up trash from beaches, parks, and highways.<sup>28, 1992</sup>

### ***Future and Planned Usage***

The *General Plan: City and County of Honolulu* states that there are no plans to create additional convenient center, transfer station, or landfill operations on the North Shore.<sup>28, 1992</sup>

### ***Future and Planned Requirements or Changes***

The following future plans are outlined in the *General Plan: City and County of Honolulu*:

- Expand the use of automated refuse collection in residential areas;
- Systematically clean up illegal dump sites;
- Enforce the illegal dumping laws; and
- The region is not expected to contribute significantly to disposal of solid waste.<sup>28, 1992</sup>

### ***Anticipated Costs for the Future***

See City and County of Honolulu Solid Waste Summary for information.

### ***Problems, Issues and Opportunities Associated with Costs***

See City and County of Honolulu Solid Waste Summary for information.

### ***Compare Visitor and Resident Impact***

Due to a lack of information further study is recommended.

### ***Major Assumptions***

See City and County of Honolulu Solid Waste Summary for information.

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## **City and County of Honolulu – North Shore – Storm Water**

### ***Present Capacity and Usage***

Due to a lack of documented information further study is required.

### ***Existing Problems, Issues and Opportunities***

The *General Plan: City and County of Honolulu* lists the following existing issues:

- The existing storm water system does not meet current City drainage standard;
- Flooding is the most common reoccurring hazard due storm water runoff, channel overflows;
- A change in drainage patterns from agriculture land use and urban development,
- Clogging of natural drainage channels and streams.<sup>28, 1992</sup>

### ***Future and Planned Usage***

See City and County of Honolulu Storm Water Summary for information.

### ***Future and Planned Requirements or Changes***

The *General Plan: City and County of Honolulu* lists planned changes to the storm water drainage system.

- Improve drainage system
- Provide adequate protection from flooding
- Restrict future development
- Establish and maintain vegetation coverage
- Improve culverts and bridges<sup>28, 1992</sup>

### ***Anticipated Costs for the Future***

See City and County of Honolulu Storm Water Summary for information.

### ***Problems, Issues and Opportunities Associated with Costs***

See City and County of Honolulu Storm Water Summary for information.

### ***Compare Visitor and Resident Impact***

See City and County of Honolulu Storm Water Summary for information.

### ***Major Assumptions***

See City and County of Honolulu Introduction and Storm Water Summaries for information.

## City and County of Honolulu – North Shore – Roads

### ***Present Capacity and Usage***

The *General Plan: City and County of Honolulu* describes the only major arterial on the North Shore is Kamehameha Highway, a two-lane thoroughfare, which links North Shore communities with Central Oahu and Koolau Loa. It is a scenic highway, which traverses the coastline from Haleiwa through the communities of Kawaihoa, Waimea, Pupukea, and Sunset Beach.

Minor arterials on the North Shore include Kaukonahua Road and Farrington Highway. Kaukonahua Road is a narrow two-lane roadway, which goes from Wahiawa north to Thomson Corner and continues as Farrington Highway past Waialua and Mokuleia to Kaena Point. Numerous local streets, including Haleiwa Road, Goodale Avenue, Waialua Beach Road, and Pupukea Road, serve the rural residential communities.<sup>28, 1992</sup>

The *Oahu Regional Transportation Plan* indicated that the morning peak-hour traffic volume in the North Shore corridor is at an acceptable level and will continue to be at an acceptable level in the year 2020.<sup>253, 1995</sup>

### ***Existing Problems, Issues and Opportunities***

The *General Plan: City and County of Honolulu* notes that North Shore residents periodically experience “bottleneck” traffic congestion along the shoreline during high surf periods especially in the winter months. Kamehameha Highway becomes congested as spectators travel slowly through the area to observe the high surf. In addition, segments of Kamehameha Highway along the North Shore are sometimes closed during periods of high surf and flooding when roads are hazardous to travelers.<sup>28, 1992</sup>

### ***Future and Planned Usage***

The *General Plan: City and County of Honolulu* seeks to retain the North Shore’s unique qualities and rural character in meeting community needs, emphasizing retention of the region’s scenic open spaces.<sup>28, 1992</sup>

Transportation Systems policies and principles for the North Shore include:

- Retain Kamehameha as a two-lane thoroughfare and provide roadway improvements to promote pedestrian safety and traffic efficiency.
- Provide adequate access between residences, jobs, shopping, and recreation areas on the North Shore and to adjacent areas.
- Provide more opportunities and support facilities for convenient and safe pedestrian and bicycle travel.
- Promote ride-sharing activities such as car/van pooling. Reduce commute to work with options such as telecommuting.

- Include considerations of visitor population in determining allocations of resources and facilities for the North Shore.<sup>28, 1992</sup>

### ***Future and Planned Requirements or Changes***

The *General Plan: City and County of Honolulu* states that the Oahu Regional Transportation Plan identifies two proposed City and County improvement projects to the roadway network:

- Minor safety improvements (realignment of horizontal curves) on Kaukonahua Road, mauka of Thompson corner, 2001 – 2005; and
- Addition of left-turn lanes on Kamehameha Highway at Haleiwa Road and Paalaa Road, 2006 – 2020.
- Other proposed projects include improvements to Kamehameha Highway, Waialua Beach Road, Kaukonahua Road and Wilikina Drive.<sup>28, 1992</sup>

### ***Anticipated Costs for the Future***

See City and County of Honolulu Roads Summary for information.

### ***Problems, Issues and Opportunities Associated with Costs***

See City and County of Honolulu Roads Summary for information.

### ***Compare Visitor and Resident Impact***

Analysis of county documents shows that more parking or turn offs and scenic overlooks are needed along the roadway to accommodate sightseers.

### ***Major Assumptions***

See City and County of Honolulu Roads Summary for information.

## **City and County of Honolulu – North Shore – Airports**

### ***Present Capacity and Usage***

The Dillingham Airfield is located near the slopes of the Waianae Mountains and the ocean. The airport services general aviation demands for small aircraft including civilian-powered flights, sailplane/glider flights, and parachute activities, as well as, military flights.<sup>28, 1992</sup> The airfield is one of two secondary airports for Oahu as noted in the Final Statewide Airport System Plan.<sup>127, 1998</sup>

### ***Existing Problems, Issues and Opportunities***

See City and County of Honolulu Airports Summary for information.

### ***Future and Planned Usage***

According to the State Department of Transportation there are no plans for future expansion at the Dillingham Airfield. As stated in the Final Statewide Airport System Plan the Dillingham Airfield will continue as a civilian/military joint operations airfield. Existing facilities will be upgraded to enhance safety and operational requirements.<sup>127, 1998</sup>

### ***Future and Planned Requirements or Changes***

See City and County of Honolulu Airports Summary for information.

### ***Anticipated Costs for the Future***

See City and County of Honolulu Airports Summary for information.

### ***Problems, Issues and Opportunities Associated with Costs***

Due to a lack of information further study is recommended.

### ***Compare Visitor and Resident Impact***

See City and County of Honolulu Airports Summary for information.

### ***Major Assumptions***

The Final Statewide Airport System Plan makes the following assumption that operations accompanying demand for additional capacity due to general aviation increases are not likely to be realized. Therefore, Dillingham airport will not require major capital improvements over the next 20-30 years.<sup>127, 1998</sup>

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## **City and County of Honolulu – North Shore – Harbors**

### ***Present Capacity and Usage***

The *General Plan: City and County of Honolulu* describes the State owned, Department of Land and Natural Resources operated recreational boat harbor. Located at Waialua Bay the harbor contains approximately 7.4 acres of protected waters and contains **63 berthing spaces** and **15 mooring spaces**.

There is no commercial harbor in North Shore.<sup>28, 1992</sup>

### ***Existing Problems, Issues and Opportunities***

The *General Plan: City and County of Honolulu* notes that the current waiting list for a slip is 50 people with an approximate waiting period of 6 years.

### ***Future and Planned Usage***

The *General Plan: City and County of Honolulu* envisions slip capacity will be reduced to accommodate larger vessels.<sup>28, 1992</sup>

### ***Future and Planned Requirements or Changes***

See City and County of Honolulu Harbors Summary information.

### ***Anticipated Costs for the Future***

See City and County of Honolulu Harbors Summary information.

### ***Problems, Issues and Opportunities Associated with Costs***

See City and County of Honolulu Harbors Summary information.

### ***Compare Visitor and Resident Impact***

The recreational boat harbor is utilized by residents the majority of the time. Impact to harbor by visitors is minimal.

### ***Major Assumptions***

See City and County of Honolulu Introduction and Harbors Summaries information.

## City and County of Honolulu – North Shore – Parks

### ***Present Capacity and Usage***

The *General Plan: City and County of Honolulu* notes the only types of island-based parks on the North Shore are beach/shoreline parks and right-of-ways.

Existing community-based parks on the North Shore are Kamananui Neighborhood Park, Sunset Beach Neighborhood Park, and Waialua District Park. To expand active recreational opportunities in the region, a couple of island-based beach parks, such as Haleiwa and Pupukea Beach parks, are equipped with ballparks.

The State Department of Land and Natural Resources (DLNR) manages two parks in the area: Kaena Point State Park and Puu O Mahuka Heiau State Monument. The Kaena Point State Park extends from Dillingham Airfield around Kaena Point to Makua Valley on the west side of the Waianae Range. It is located at the end of Farrington Highway on 779 acres of land. The park offers opportunities for picnicking and shore fishing along a relatively remote wilderness coastline. Puu O Mahuka Heiau State Monument is situated on 5.7 acres overlooking Waimea Bay Beach Park off Pupukea Road. A low-walled, platform-type temple with two adjoining structures, it is Oahu's largest heiau.<sup>28, 1992</sup>

The *National Park Service Statistical Abstract* states that the Puukohola Heiau National Historic Site had 54,745 visits in the year 2001.<sup>136, 2002</sup>

### ***Existing Problems, Issues and Opportunities***

The *General Plan: City and County of Honolulu* states that according to the Department of Parks and Recreation, there is currently a shortage of community-based parks in the North Shore area. Mokuleia Beach Park, Makaleha Beach Park, and Aweoweo Beach Park currently lack facilities. There are no existing or planned public golf courses on the North Shore.<sup>28, 1992</sup>

### ***Future and Planned Usage***

Based on projected population for the year 2020, it is anticipated that there will be a need for an additional community park (average 10 acres) and two additional neighborhood parks (average 4 to 6 acres) for the North Shore. The Department of Parks and Recreation has identified Aweoweo, Haleiwa Beach Park Mauka (commonly referred to as Haleiwa Regional Park), and Puuiki Park as potential community-based parks to address the shortage of these parks on the North Shore.<sup>28, 1992</sup>

### ***Future and Planned Requirements or Changes***

The *General Plan: City and County of Honolulu* lists future changes as follows:

- Kaunala Beach Park, Laniakea Beach Support Park, Kawailoa Beach Support Park, Leftovers Beach Park, Uppers Beach Park, and Kahawai Beach Support Park are planned additions to the DPR park system.
- Camping facilities are planned for Waialea Beach Park.
- Provide an integrated system of pedestrian paths/bikeways linking the parks, schools, and town centers in Haleiwa and Waialua.<sup>28, 1992</sup>

### ***Anticipated Costs for the Future***

See City and County of Honolulu Parks Summary for information.

### ***Problems, Issues and Opportunities Associated with Costs***

See City and County of Honolulu Parks Summary for information.

### ***Compare Visitor and Resident Impact***

Both residents and visitors heavily use the parks.

### ***Major Assumptions***

The *National Park Service Statistical Abstract* states the 2002 forecast for the Puukohola Heiau National Historic Site is of 58,217 visits, 6.34% more than in 2001. The 2003 forecast is of 355,688 visits.<sup>136, 2002</sup>

## **City and County of Honolulu – North Shore – Police, Fire and Emergency Services**

### ***Present Capacity and Usage***

According to the *North Shore Sustainable Communities Plan*, the North Shore Sustainable Communities Plan area is considered part of the Honolulu Police Department's (HPD) District 2, which includes Wahiawa, and is divided into 12 patrol beats. Currently, there are four beats covering the North Shore Sustainable Communities Plan area. Police service is determined by staffing, not facilities, because the officers respond to scenes from the road, not stations.

The Honolulu Fire Department (HFD) provides adequate service and operates fire stations at Sunset Beach and Waialua-Haleiwa.

The Emergency Services Department, Ocean Safety Division, provides approximately 30 water safety officers and lifeguard service for the following lifeguard tower on the North Shore: Sunset Beach, Ehukai, Ke Waena, Waimea Bay and Haleiwa Alii Beach. The number of water safety officers within the district will fluctuate seasonally, with more officers assigned to the area during the high surf season in the winter and less during the summer months.<sup>96, 2000</sup>

See Central Oahu Police, Fire and Emergency Medical Services Summary for information. The police districts and planning districts are not the same.

### ***Existing Problems, Issues and Opportunities***

According to the *North Shore Sustainable Communities Plan*, staffing, not facilities determines police service. HPD would not object to office space being allotted as a base for the beat officers, as long as there is no requirement for any "round the clock" staffing, as it is costly to construct such a facility and maintain and staff such a facility for 24 hours, 7 days a week.

Flood is the most common and recurring hazard. Under heavy, continuous rain and flooding conditions, Oahu Civil Defense Agency (OCDA) plans are in place to evacuate large portions of Haleiwa and Waialua, if required, and include additional evacuation options in the event Wilson Dam were to fall.<sup>96, 2000</sup>

### ***Future and Planned Usage***

According to the *North Shore Sustainable Communities Plan*, if North Shore communities expand or existing areas are built upon, new Fire Department facilities may be needed. The HPD has estimated that an additional two beats will be needed to serve the North Shore area over the next 20 years. It is noted by Ocean Safety officials that rescue craft patrols will play a larger role in extending lifeguard services in response to new or expanded beach parks in the region.<sup>96, 2000</sup>

### ***Future and Planned Requirements or Changes***

According to the *North Shore Sustainable Communities Plan*, general policies include:

- Promote an integrated approach to public safety on the North Shore, which will enable police, fire, ocean safety, civil defense, and emergency medical efforts to share resources and information, as appropriate.
- Consider visitor populations in allocating public safety resources.
- Provide adequate staffing facilities to ensure effective and efficient delivery of basic government service and protection of public safety.
- Approve new development only if staffing and facilities will be adequate to provide police and fire protection when development is completed.
- Increase police presence, including car and bicycle patrols and community policing efforts, especially in high-theft areas such as beach parks. Support the availability of adequate staffing and funding to enable this.
- Consider establishment of facilities, which police officers could use as a local base of operations.
- Promote the creation of safe, crime-deterrent public and private environments by encouraging the use of crime-preventive principles in the planning and design of communities, open spaces, circulation networks and buildings.<sup>96, 2000</sup>

According to the *North Shore Sustainable Communities Plan*, planning for the area must include preparedness education and the provision of adequate warning devices, adequate transportation routes for evacuee movement, and suitable shelters where evacuees can seek refuge. The OCDA recommends that any new public buildings such as schools and recreation centers be required to consider emergency shelter capabilities as a secondary use of the building.<sup>96, 2000</sup>

### ***Anticipated Costs for the Future***

See City and County of Honolulu and Central Oahu Police, Fire and Emergency Medical Services Summaries for information.

### ***Problems, Issues and Opportunities Associated with Costs***

See City and County of Honolulu and Central Oahu Police, Fire and Emergency Medical Services Summaries for information.

### ***Compare Visitor and Resident Impact***

See City and County of Honolulu Introduction and Central Oahu Police, Fire and Emergency Medical Services Summaries for information.

### ***Major Assumptions***

See City and County of Honolulu and Central Oahu Police, Fire and Emergency Medical Services Summaries for information.

## **City and County of Honolulu – North Shore – Visitor Accommodations**

### ***Present Capacity and Usage***

Analysis of county documents shows that there are no major visitor accommodations in the North Shore. Accommodations are limited to Bed and Breakfast and vacation rentals units that are unregulated and unaccounted for.

### ***Existing Problems, Issues and Opportunities***

Analysis of county documents shows that Bed and Breakfast and vacation rentals are unregulated.

### ***Future and Planned Usage***

The *General Plan: City and County of Honolulu* plans for future development of visitor accommodations in the North Shore. Allow for small-scale visitor facilities that are compatible with the rural character and natural features of the region. These include country inns in Haleiwa and Waialua Country Town districts in appropriate locations.<sup>28, 1992</sup>

### ***Future and Planned Requirements or Changes***

The *General Plan: City and County of Honolulu* gives general policies for the requirements of visitor accommodation development in the North Shore.

- Facility design criteria for country inns should be consistent with the guidelines of the country town districts in which they are located. In general, visitor facilities should observe the same building envelope and design standards of adjacent buildings.
- Development of visitor facilities should be oriented toward integration with the social and economic life of the surrounding communities.
- Facility development should not degrade, deplete, or preclude legitimate public access to public lands or resources.
- Minimize impacts on resources, infrastructure, or surrounding communities.
- Development of country inns should be small in scale or be compatible in scale with the old Haleiwa Hotel (40 rooms).<sup>28, 1992</sup>

### ***Anticipated Costs for the Future***

Analysis of county documents shows that visitor accommodations are privately owned and operated. Information on future costs was not available from county documents.

### ***Problems, Issues and Opportunities Associated with Costs***

Analysis of county documents shows that visitor accommodations are privately owned and operated. Information on problems, issues and opportunities with future costs was not available from county documents.

### ***Compare Visitor and Resident Impact***

Analysis of county documents shows that the North Shore is a high visitor use area especially for sight seeing in the winter months when high surf is an attraction.

### ***Major Assumptions***

See City and County of Honolulu Introduction and Visitor Accommodation Summaries information.

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## **City and County of Honolulu – North Shore – Private Transportation**

### ***Present Capacity and Usage***

No documentation was uncovered regarding private transportation at the community level. Therefore, no evaluation was made.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – North Shore – Energy Systems**

### ***Present Capacity and Usage***

No documentation was uncovered regarding energy systems at the community level. Therefore, no evaluation was made. See City and County of Honolulu Energy Systems summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – North Shore – Sewer Systems**

### ***Present Capacity and Usage***

There was little to distinguish private sewer systems from public sewage at the community level. See City and County of Honolulu Sewage summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – North Shore – Coastal Water Quality**

### ***Present Capacity and Usage***

There was little documentation for coastal water quality at the community level. See State of Hawaii Coastal Water Quality summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – North Shore – Marine Ecosystem Health**

### ***Present Capacity and Usage***

There was little documentation for marine ecosystem health at the community level. See State of Hawaii Marine Ecosystem Health summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – North Shore – Forestry / Green Space**

### ***Present Capacity and Usage***

There was little documentation for forestry / green space at the community level. See State of Hawaii Forestry / Green Space summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – North Shore – Air Quality**

### ***Present Capacity and Usage***

There was little documentation for air quality at the community level. See State of Hawaii Air Quality summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – North Shore – Beach Erosion**

### ***Present Capacity and Usage***

There was little documentation for beach erosion at the community level. See State of Hawaii Beach Erosion summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – North Shore – Invasive Species**

### ***Present Capacity and Usage***

There was little documentation for invasive species at the community level. See State of Hawaii Invasive Species summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – North Shore – Other Natural / Scenic Resources**

### ***Present Capacity and Usage***

There was little documentation for riparian / wetlands, native species or other natural / scenic resources at the community level. See State of Hawaii Natural / Scenic Resources summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – Koolau Loa – Water Quality and Quantity**

### ***Present Capacity and Usage***

The *General Plan: City and County of Honolulu* describes the water supply in Koolau Loa. The Board of Water Supply (BWS) supplies water to most of Koolau Loa, while the Laie Water Company (LWC) provides water to approximately 8,000 residences as well as commercial and agricultural uses in Laie, BYU-Hawaii, and the Polynesian Cultural Center (PCC). Agricultural water is supplied by stream diversions and groundwater wells.<sup>28, 1992</sup>

### ***Existing Problems, Issues and Opportunities***

See City and County of Honolulu Water Summary for information.

### ***Future and Planned Usage***

The *General Plan: City and County of Honolulu* states that by the year 2020, it is projected that potable water demand from both the BWS and LWC will double to approximately 6.0mgd. This estimate does not include military, agricultural and other non-municipal uses. The current potable water demand is approximately 3.0mgd.<sup>28, 1992</sup>

### ***Future and Planned Requirements or Changes***

See City and County of Honolulu Water Summary for information.

### ***Anticipated Costs for the Future***

See City and County of Honolulu Water Summary for information.

### ***Problems, Issues and Opportunities Associated with Costs***

See City and County of Honolulu Water Summary for information.

### ***Compare Visitor and Resident Impact***

Analysis of county documents shows that the Laie Water Company (LWC) provides water to the Polynesian Cultural Center (PCC), a major tourist attraction in Laie. The area also has some visitor accommodations.

### ***Major Assumptions***

See City and County of Honolulu Water Summary for information.

## **City and County of Honolulu – Koolau Loa – Sewage**

### ***Present Capacity and Usage***

According to the *Koolau Loa Sustainable Communities Plan* the Kahuku Wastewater Treatment Plant, (WWTP) services the Koolau Loa region. The facility has a design capacity of 0.4 MGD average flow.

The Laie Water Reclamation Facility, (WRF) has a 0.9mgd treatment capacity, which can accommodate the existing and proposed development in Laie. As stated in the *Koolau Loa Sustainable Communities Plan* the facility utilizes an activated sludge aeration/clarifier treatment process.<sup>95, 1999</sup>

### ***Existing Problems, Issues and Opportunities***

The *Koolau Loa Sustainable Communities Plan* notes that the WWTP is operating at 30 to 40 percent of capacity.

Replacement of outdated cesspools with approved septic systems is noted as an opportunity.<sup>95, 1999</sup>

### ***Future and Planned Usage***

Future changes for the Koolau Loa region as stated in the *Koolau Loa Sustainable Communities Plan* include:

- Develop methods for water reclamation for use in agriculture, landscape irrigation, and other non-potable water uses.
- Use buffer zones and landscape elements to establish and maintain a sufficient separation between wastewater treatment plants and nearby urban uses.
- Develop processes to eliminate or lessen the severity of odors generated at wastewater treatment plants.<sup>95, 1999</sup>

### ***Future and Planned Requirements or Changes***

Planned changes as outlined in the *Koolau Loa Sustainable Communities Plan* for the Koolau Loa region include:

- Standardize methods for water recycling at the Kahuku Wastewater Treatment Plant;
- Treat and beneficially use reclaimed water for irrigation; and
- Provide the centralized wastewater collection system infrastructure necessary to eliminate individual cesspools, thereby protecting aquifers, streams, estuaries and near shore waters from contamination.<sup>95, 1999</sup>

### ***Anticipated Costs for the Future***

See City and County of Honolulu Sewage Summary for information.

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***Problems, Issues and Opportunities Associated with Costs***

See City and County of Honolulu Sewage Summary for information.

***Compare Visitor and Resident Impact***

See City and County of Honolulu Sewage Summary for information.

***Major Assumptions***

See City and County of Honolulu Sewage Summary for information.

## **City and County of Honolulu – Koolau Loa – Solid Waste Disposal**

### ***Present Capacity and Usage***

The *General Plan: City and County of Honolulu* describes solid waste disposal in Koolau Loa, there is one convenience center at Laie where residents can dispose of household rubbish, green waste, and large items. Residents can also dispose of green waste at the Laie Water Reclamation Facility, which has a composting facility.<sup>28, 1992</sup>

### ***Existing Problems, Issues and Opportunities***

See City and County of Honolulu Solid Waste Summary for information.

### ***Future and Planned Usage***

According to the *General Plan: City and County of Honolulu* there are no plans to create an additional convenience center, transfer station or landfill operation in Koolau Loa.<sup>28, 1992</sup>

### ***Future and Planned Requirements or Changes***

The following guidelines are outlined in the *General Plan: City and County of Honolulu*:

- Promote the recycling of waste materials by providing expanded collection facilities and services, and public outreach and education programs.
- Encourage recycling of regional green waste at the City facility and the Laie Water Reclamation Facility composting operation; and
- Expand the use of automated refuse collection in residential areas.<sup>28, 1992</sup>

### ***Anticipated Costs for the Future***

See City and County of Honolulu Solid Waste Summary for information.

### ***Problems, Issues and Opportunities Associated with Costs***

See City and County of Honolulu Solid Waste Summary for information.

### ***Compare Visitor and Resident Impact***

See City and County of Honolulu Introduction and Solid Waste Summaries for information.

### ***Major Assumptions***

See City and County of Honolulu Introduction and Solid Waste Summaries for information.

## **City and County of Honolulu – Koolau Loa – Storm Water**

### ***Present Capacity and Usage***

The *General Plan: City and County of Honolulu* describes the storm water drainage system in Koolau Loa. The major streams that drain the valleys of Koolau Loa include: Kaaawa Stream, Maakuo Stream, Kawa Stream, Waiono Stream, Kaluanui Stream, Kaipapau Stream, Laiemaloo Stream, Waialele Stream, Kahawainui Stream in Kahana and Laie, Malaekahana Stream, Ohia Stream, Kawela Stream, Oio Stream, "Hospital Ditch," and other drainageways. These streams originate in the Koolau Range and eventually discharge into the ocean along the Koolau Loa coast. The drainage basins vary in size, some being long and narrow, and others including significant collection areas in the agricultural lowlands.<sup>28, 1992</sup>

### ***Existing Problems, Issues and Opportunities***

The *General Plan: City and County of Honolulu* lists existing issues in Koolau Loa as follows:

- Several drainageways have been prone to flooding during the more intense rainfall events. In particular, lands surrounding Punaluu Stream, Waialele Stream and Malaekahana Stream have experienced severe flooding during recent years.
- Heavy rainfall at the head of the valleys, combined with debris clogging the lowland channels, has on occasion overwhelmed the capacity of these drainageways. In many areas of Koolau Loa, the pavement of Kamehameha Highway diverts or detains the overland flow of storm water runoff toward the ocean. This condition can cause localized flooding of the highway and mauka side properties.
- Drainage problems exist in Kahuku in the lowland floodplains of Ohia, Kalaeo Kahipa, and Malaekahana Streams. As existing drainage facilities are inadequate during major storm events, the runoff from mauka areas floods the campus of Kahuku High and Intermediate School, as well as portions of the commercial area and the Walkerville residential area.<sup>28, 1992</sup>

### ***Future and Planned Usage***

The *General Plan: City and County of Honolulu* notes that agencies from the City, State Department of Land and Natural Resources, the U.S. Army Corps of Engineers and the Estate of James Campbell are coordinating their efforts in a regional drainage assessment that provides alternative solutions.<sup>28, 1992</sup>

### ***Future and Planned Requirements or Changes***

The *General Plan: City and County of Honolulu* lists future changes as follows:

- Construction of flood control improvements including a berm is being considered along the Waialele Stream.

- The State Department of Transportation has scheduled bridge improvements at Malaekahana Stream to alleviate highway flooding conditions. <sup>28, 1992</sup>

### ***Anticipated Costs for the Future***

See City and County of Honolulu Storm Water Summary for information.

### ***Problems, Issues and Opportunities Associated with Costs***

See City and County of Honolulu Storm Water Summary for information.

### ***Compare Visitor and Resident Impact***

See City and County of Honolulu Introduction and Storm Water Summaries for information.

### ***Major Assumptions***

See City and County of Honolulu Introduction and Storm Water Summaries for information.

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## **City and County of Honolulu – Koolau Loa – Roads**

### ***Present Capacity and Usage***

The *General Plan: City and County of Honolulu* describes the single highway (State Highway 83), 19 miles along Kamehameha coastline as the only link to North Shore and Windward side. The stretch of highway experiences high usage for commuting to work and shopping.<sup>28, 1992</sup>

### ***Existing Problems, Issues and Opportunities***

See City and County of Honolulu Roads Summary for information.

### ***Future and Planned Usage***

There are currently no plans for projects that would increase highway capacity. However there are plans for bridge replacement and coastline reinforcement along areas where coastal erosion has occurred.<sup>28, 1992</sup>

### ***Future and Planned Requirements or Changes***

See City and County of Honolulu Roads Summary for information.

### ***Anticipated Costs for the Future***

See City and County of Honolulu Roads Summary for information.

### ***Problems, Issues and Opportunities Associated with Costs***

See City and County of Honolulu Roads Summary for information.

### ***Compare Visitor and Resident Impact***

See City and County of Honolulu Introduction and Roads Summaries for information.

### ***Major Assumptions***

See City and County of Honolulu Introduction and Roads Summaries for information.

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## **City and County of Honolulu – Koolau Loa – Airports**

### ***Present Capacity and Usage***

Analysis of county documents shows there are no airports in the Koolau Loa region.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – Koolau Loa – Harbors**

### ***Present Capacity and Usage***

Analysis of county documents shows there are no commercial harbors in the Koolau Loa region. There is a boat launching ramp at Kahana Bay.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

## **City and County of Honolulu – Koolau Loa – Parks**

### ***Present Capacity and Usage***

The *General Plan: City and County of Honolulu* notes that open space and recreational areas are important assets of the Koolau Loa region. The region contains numerous beach parks along its coastline and State parks such as Kaliuwaa (Sacred Falls), Malaekahana and Kahana Valley.<sup>28, 1992</sup>

The *State Parks of the Island of Oahu* describes Kahana Valley State Park as providing swimming, bodysurfing, picnicking, camping, and viewing of Huilua Fishpond at the beach. There is a hardy family hike (4.9 miles) and fruit picking in lush vegetated forest. The facility is approximately 5,228 acre.

The Malaekahana State Recreation Area, a wooded beach park provides swimming, bodysurfing, picnicking, camping, and shore fishing. The 110 acres facility is located off Kamehameha Highway 0.6 mile north of Laie town.

The Laie Point State Wayside provides good shore fishing from the sea cliff and scenic views of a sea arch and seabird sanctuary island. The wayside is located off Kamehameha Highway at Laie town via Anemoku Street.<sup>131, 2002</sup>

### ***Existing Problems, Issues and Opportunities***

The *General Plan: City and County of Honolulu* states the Sacred Falls State Park 1,374-acre facility is closed indefinitely due to a landslide tragedy that occurred in 1999. It is located on Kamehameha Highway one mile south of Hauula Town Trail.<sup>28, 1992</sup>

### ***Future and Planned Usage***

See City and County of Honolulu Parks Summary for information.

### ***Future and Planned Requirements or Changes***

See City and County of Honolulu Parks Summary for information.

### ***Anticipated Costs for the Future***

See City and County of Honolulu Parks Summary for information.

### ***Problems, Issues and Opportunities Associated with Costs***

See City and County of Honolulu Parks Summary for information.

### ***Compare Visitor and Resident Impact***

See City and County of Honolulu Introduction and Parks Summaries for information.

### ***Major Assumptions***

See City and County of Honolulu Introduction and Parks Summaries for information.

## City and County of Honolulu – Koolau Loa – Police, Fire and Emergency Services

### ***Present Capacity and Usage***

According to the *Koolau Loa Sustainable Communities Plan*, the Honolulu Police Department (HPD) services Koolau Loa out of the Kahuku Police Substation. The Kahuku Substation currently has **27 staff and officers** that are assigned to the area from Kaaawa to Waialeale Stream.

The Honolulu Fire Department (HFD) has no plans for new stations in Koolau Loa nor do they anticipate increasing personnel at either of the two existing stations.

Emergency care is provided from Kahuku Hospital. The hospital is outfitted with modern equipment and facilities, and a medical staff of **15 physicians and 60 employees**.<sup>95, 1999</sup>

### ***Existing Problems, Issues and Opportunities***

The *Honolulu Police Department 2000 Annual Report* describes the police districts. District 4 encompasses all of Windward Oahu.

- The district's Crime Reduction Unit (CRU) provided valuable support to both field and specialized units. The CRU focused primarily on crimes against tourists, drug offenses, and property crimes, and helped to break up several series of burglaries and thefts.
- In an effort to provide better service in the major beach area, the district has expanded its use of all-terrain vehicles to patrol the Waimanalo and Kailua beach and park areas.<sup>53, 2000</sup>

### ***Future and Planned Usage***

See City and County of Honolulu Police, Fire and Emergency Medical Services Summary for information.

### ***Future and Planned Requirements or Changes***

The *Koolau Loa Sustainable Communities Plan* outline the following Planning Principles and guidelines:

- Consider the establishment of a permanent Satellite City Hall in Koolau Loa, using the existing facility in Hauula or a new facility in Laie.
- Support the planning and programming of public facilities to create maximum usage flexibility. In addition, encourage interagency coordination in better utilization of existing facilities to provide a more integrated approach to delivering services in the region. Examples could include using school facilities as emergency shelters, requiring that all new public buildings serve a secondary function as an emergency shelter, and

- establishing satellite city halls as multipurpose facilities with expanded house and services for area residents.
- Provide adequate staffing and facilities for fire/ambulance and police protection as required to support new developments.
  - Allow for the possible development of other health related facilities that will support the continued viability of Kahuku Hospital and provide critical complimentary health services for the community. <sup>95, 1999</sup>

### ***Anticipated Costs for the Future***

See City and County of Honolulu Police, Fire and Emergency Medical Services Summary for information.

### ***Problems, Issues and Opportunities Associated with Costs***

See City and County of Honolulu Police, Fire and Emergency Medical Services Summary for information.

### ***Compare Visitor and Resident Impact***

See City and County of Honolulu Introduction and Police, Fire and Emergency Medical Services Summaries for information.

### ***Major Assumptions***

See City and County of Honolulu Introduction and Police, Fire and Emergency Medical Services Summaries for information.

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## **City and County of Honolulu – Koolau Loa – Visitor Accommodations**

### ***Present Capacity and Usage***

Analysis of county documents shows that there is one major visitor accommodation in the Koolau Loa. Most accommodations are limited to Bed and Breakfast and vacation rentals units that are unregulated and unaccounted for.

### ***Existing Problems, Issues and Opportunities***

Analysis of county documents shows that Bed and Breakfast and vacation rentals are unregulated.

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – Koolau Loa – Private Transportation**

### ***Present Capacity and Usage***

No documentation was uncovered regarding private transportation at the community level. Therefore, no evaluation was made.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – Koolau Loa – Energy Systems**

### ***Present Capacity and Usage***

No documentation was uncovered regarding energy systems at the community level. Therefore, no evaluation was made. See City and County of Honolulu Energy Systems summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – Koolau Loa – Sewer Systems**

### ***Present Capacity and Usage***

There was little to distinguish private sewer systems from public sewage at the community level. See City and County of Honolulu Sewage summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – Koolau Loa – Coastal Water Quality**

### ***Present Capacity and Usage***

There was little documentation for coastal water quality at the community level. See State of Hawaii Coastal Water Quality summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – Koolau Loa – Marine Ecosystem Health**

### ***Present Capacity and Usage***

There was little documentation for marine ecosystem health at the community level. See State of Hawaii Marine Ecosystem Health summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – Koolau Loa – Forestry / Green Space**

### ***Present Capacity and Usage***

There was little documentation for forestry / green space at the community level. See State of Hawaii Forestry / Green Space summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – Kooalu Loa – Air Quality**

### ***Present Capacity and Usage***

There was little documentation for air quality at the community level. See State of Hawaii Air Quality summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – Koolau Loa – Beach Erosion**

### ***Present Capacity and Usage***

There was little documentation for beach erosion at the community level. See State of Hawaii Beach Erosion summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – Koolau Loa – Invasive Species**

### ***Present Capacity and Usage***

There was little documentation for invasive species at the community level. See State of Hawaii Invasive Species summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – Koolau Loa – Other Natural / Scenic Resources**

### ***Present Capacity and Usage***

There was little documentation for riparian / wetlands, native species or other natural / scenic resources at the community level. See State of Hawaii Natural / Scenic Resources summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

## **City and County of Honolulu – Koolau Poko – Water Quality and Quantity**

### ***Present Capacity and Usage***

The *General Plan: City and County of Honolulu* describes the water supply in Koolau Poko. Potable water primarily supplied by Board of Water Supply. **11.5mgd** flow from Waiahole Ditch to Koolau Poko's streams. Irrigation water for Waiahole and Waikane areas is drawn from the Waiahole stream. Farmers rely on local groundwater sources and rainfall while a few Taro farmers take advantage of the ancient irrigation systems built by early Hawaiians. Waimanalo area of the state delivers ~.75 mgd of water to farmers from the Maunawili Ditch from high level water tunnels.<sup>28, 1992</sup>

### ***Existing Problems, Issues and Opportunities***

See City and County of Honolulu Water Summary for information.

### ***Future and Planned Usage***

The *General Plan: City and County of Honolulu* states that the major source of future potable water demand in Koolau Poko will be in the development of residential lots in Waimanalo and Waiahole. Demand **19.9mgd** of potable water is expected by the year 2020.<sup>28, 1992</sup>

### ***Future and Planned Requirements or Changes***

A future requirement noted in the *General Plan: City and County of Honolulu* is maintaining Waiahole Ditch and tunnel systems.<sup>28, 1992</sup>

### ***Anticipated Costs for the Future***

See City and County of Honolulu Water Summary for information.

### ***Problems, Issues and Opportunities Associated with Costs***

See City and County of Honolulu Water Summary for information.

### ***Compare Visitor and Resident Impact***

See City and County of Honolulu Water Summary for information.

### ***Major Assumptions***

See City and County of Honolulu Water Summary for information.

## **City and County of Honolulu – Koolau Poko – Sewage**

### ***Present Capacity and Usage***

According to the *General Plan: City and County of Honolulu* the Koolau Poko region is primarily served by centralized wastewater treatment facilities. There are two wastewater service areas within the region, Kailua-Kaneohe-Kahaluu and the Waimanalo. The Kailua-Kaneohe-Kahaluu area is served by the Kailua WWTP, which has an average capacity of **15 million gallons per day (GPD)**. The Kaneohe treatment plant provides service to the Kaneohe and Ahuimanu areas.<sup>28, 1992</sup>

### ***Existing Problems, Issues and Opportunities***

Problems for the Koolau Poko region as outlined in the *General Plan: City and County of Honolulu* include:

- Un-sewered areas in the northern 2/3 's of the Koolau Poko district is in Kahaluu;
- The Kailua WWTP has “wet water surge problems”, which ultimately results in untreated sewage reaching the ocean; and
- Portions of the collection system, which are located in low-lying areas, are subject to seawater intrusion.<sup>28, 1992</sup>

### ***Future and Planned Usage***

Planned changes for the Koolau Poko region as outlined in the *General Plan: City and County of Honolulu* include:

- The repair of leaks in the wastewater collection system infrastructure;
- The elimination of private rainwater connections to the wastewater collection system infrastructure; and
- Wet water storage capacity in underground pipes.<sup>28, 1992</sup>

### ***Future and Planned Requirements or Changes***

Future changes for the Koolau Poko region as outlined in the *General Plan: City and County of Honolulu* include:

- Rehabilitation of the existing wastewater collection system infrastructure.
- Eliminate noise and odor nuisances at the Kailua RWWTP.
- Connect Heeia Kea boat harbor to the municipal sewerage system.
- Connection of homes, which currently rely on cesspools or septic systems for wastewater treatment.<sup>28, 1992</sup>

### ***Anticipated Costs for the Future***

See City and County of Honolulu Sewage Summary for information.

### ***Problems, Issues and Opportunities Associated with Costs***

See City and County of Honolulu Sewage Summary for information.

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### ***Compare Visitor and Resident Impact***

See City and County of Honolulu Introduction and Sewage Summaries for information.

### ***Major Assumptions***

In accordance with the *General Plan: City and County* of Honolulu the major assumption for Koolau Poko is that funds necessary to improve and replace the region's aging wastewater infrastructure will be available.<sup>28, 1992</sup>

## **City and County of Honolulu – Koolau Poko – Solid Waste Disposal**

### ***Present Capacity and Usage***

The landfill in Kailua is closed and is being monitored. See City and County of Honolulu Solid Waste Summary for information.

### ***Existing Problems, Issues and Opportunities***

See City and County of Honolulu Solid Waste Summary for information.

### ***Future and Planned Usage***

According to the *General Plan: City and County of Honolulu* a new refuse convenience center will be provided for the Kahaluu district. <sup>28, 1992</sup>

### ***Future and Planned Requirements or Changes***

The following guidelines are outlined in the *General Plan: City and County of Honolulu*:

- Continue efforts to establish more efficient waste reduction, diversion and collection systems without adverse impact on residents; and
- Further encourage green waste recycling. <sup>28, 1992</sup>

### ***Anticipated Costs for the Future***

See City and County of Honolulu Solid Waste Summary for information.

### ***Problems, Issues and Opportunities Associated with Costs***

See City and County of Honolulu Solid Waste Summary for information.

### ***Compare Visitor and Resident Impact***

See City and County of Honolulu Solid Waste Summary for information.

### ***Major Assumptions***

The following assumptions are outlined in the *General Plan: City and County of Honolulu*:

- No growth over the 20 year projection horizon of general plan;
- Continued protection of the community's natural, scenic, cultural, historic and agricultural resources; and
- Continued improvement to and replacement of the region's aging infrastructure systems. <sup>28, 1992</sup>

## City and County of Honolulu – Koolau Poko – Storm Water

### ***Present Capacity and Usage***

The *Task Force to Create a Master Plan for Water Quality and Flood Mitigation* describes the Waimanalo watershed area as being comprised of 6,132 acres of which 3,029 are in agriculture; 334 acres are in urban or residential use; 994 acres are set aside as military reservation; 257 acres are in parks and recreation usage; and 1,518 acres are in preservation. There are 105 farming units including nurseries with 822 acres irrigated.

The existing Waimanalo Valley drainage system consists primarily of overland flow to numerous natural watercourses, which reduce to three major stream outlets discharging into Waimanalo Bay. The three outlets are: Waimanalo Stream, which drains about 4.8 square miles, Inoaole Stream, which drains about 3.3 square miles, and an unnamed stream to the south which drains about 0.5 square miles.

Waimanalo Stream is a gauged perennial stream with an average discharge of **1.17 billion gallons**, and Inoaole Stream is intermittent. The estimated peak flows into Waimanalo Bay for the most severe storm likely to occur once in 100 years are 14,000 and 13,000 cubic feet per second, respectively. Kailua Reservoir impounds flows on a portion of Waimanalo Stream.

This predominant agricultural valley relies heavily on irrigation. Lateral irrigation flumes and ditches at 3 elevation levels were installed to tap the stream flows. A network of small irrigation ditches and reservoirs operated by the State Department of Agriculture is connected to the overall drainage system. However, this irrigation system, has minimal drainage utility for large storms since the conveyance capacities of the flumes and storage capacities of the reservoirs are limited.<sup>81, 2001</sup>

### ***Existing Problems, Issues and Opportunities***

The *General Plan: City and County of Honolulu* suggests communities view storm water as a potential source of water for recharge of the aquifer that should be retained for absorption rather than quickly moved to coastal waters.<sup>28, 1992</sup>

### ***Future and Planned Usage***

The *General Plan: City and County of Honolulu* promotes drainage system design, which emphasizes control and minimization of polluted run-off and the retention of storm water on-site and in wetlands.<sup>28, 1992</sup>

The Koolau Poko Sustainable Communities Plan suggests dual use of roadway and drainage corridors. Roadways should be attractively landscaped to serve as

linear open space features and create a more inviting environment for walking, jogging and biking. Where physical modification of natural drainage ways is necessary to provide adequate flood protection, such modifications, should be designed and constructed to maintain habitat and aesthetic values, and to avoid degradation of stream, coastline and nearshore water quality.<sup>66, 2000</sup>

### ***Future and Planned Requirements or Changes***

The *General Plan: City and County of Honolulu* requires that drainage on Kailua Road between Hahani Street and Wanaao Road be improved.<sup>28, 1992</sup>

The *Task Force to Create a Master Plan for Water Quality and Flood Mitigation* suggests bridge trash racks could be installed along the Hihimanu and Kakaina Streets bridge crossings to reduce the possibility of the plugging of these bridges and of the downstream road crossing. These racks would reduce the flood levels above the roads by catching floating debris. The racks could also be designed to move the debris to an area adjacent to the road, in order for it to be removed by heavy equipment.<sup>81, 2001</sup>

### ***Anticipated Costs for the Future***

See City and County of Honolulu Storm Water Summary for information.

### ***Problems, Issues and Opportunities Associated with Costs***

See City and County of Honolulu Storm Water Summary for information.

### ***Compare Visitor and Resident Impact***

See City and County of Honolulu Storm Water Summary for information.

### ***Major Assumptions***

See City and County of Honolulu Storm Water Summary for information.

## **City and County of Honolulu – Koolau Poko – Roads**

### ***Present Capacity and Usage***

The *General Plan: City and County of Honolulu* describes the roadway system in the Koolau Poko region as follows:

- Links the windward and leeward side of island via the Likelike Highway, Pali Highway, and H-3 Freeway;
- The Kamehameha and Kahakeli Highways connect Koolau Poko to the windward side, the capacity has been increased to 6 lanes; and
- Kalanianaʻole highway scenic route from Koolau Poko to East Honolulu.<sup>28, 1992</sup>

### ***Existing Problems, Issues and Opportunities***

The *General Plan: City and County of Honolulu* states that installation of formal sidewalks is too costly in the rural areas and low traffic make road sharing practical.<sup>28, 1992</sup>

### ***Future and Planned Usage***

A goal of the *General Plan: City and County of Honolulu* is to reduce private vehicle use by promoting transportation systems management rather than implement plans for increase roadway capacity because they are inconsistent with vision to maintain the aesthetics of the area.<sup>28, 1992</sup>

### ***Future and Planned Requirements or Changes***

The *General Plan: City and County of Honolulu* recommends that improvements be made to Keaahala Road.<sup>28, 1992</sup>

### ***Anticipated Costs for the Future***

See City and County of Honolulu Roads Summary for information.

### ***Problems, Issues and Opportunities Associated with Costs***

See City and County of Honolulu Roads Summary for information.

### ***Compare Visitor and Resident Impact***

See City and County of Honolulu Roads Summary for information.

### ***Major Assumptions***

See City and County of Honolulu Roads Summary for information.

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## **City and County of Honolulu – Koolau Poko – Airports**

### ***Present Capacity and Usage***

Analysis of county documents shows there are no airports in the Koolau Poko region.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – Koolau Poko – Harbors**

### ***Present Capacity and Usage***

Analysis of county documents shows that there are no commercial harbors in the Koolau Loa region. There is a small boat harbor at Heeia.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

## City and County of Honolulu – Koolau Poko – Parks

### ***Present Capacity and Usage***

The *Koolau Poko Sustainable Communities Plan* notes that Koolau Poko is home to several wetlands listed by the U.S. Fish and Wildlife Service (USFWS) Oahu Team as significant because of the occurrence and abundance of native waterbirds, and migratory waterfowl and shorebirds. The major existing wetlands, proposed nature parks/preserves and botanical gardens of Koolau Poko are described below:

- Hoomaluhia Botanical Garden is a 211-acre park, maintained by the City, was originally developed as a federally-funded flood control project and includes a large storm water impoundment basin. It includes limited facilities for camping, horseback riding, hiking, camping and environmental education and botanical gardens.
- Kawainui Marsh serves multiple purposes as a flood storage basin, wetland filter, wildlife habitat and cultural and scenic resource pursuant to a master plan prepared in 1994.
- Nuupia Pond is a large waterbody at the neck of Mokapu Peninsula is within the Marine Corps Base Hawaii, Kaneohe and is under Federal protection and management as a habitat for endangered species
- Waihee Valley Nature Park is a site covering nearly 150 acres was acquired by the City and is designated as a Nature Park, but remains undeveloped.
- Waikane Nature Preserve is designated for a nature reserve, but is currently undeveloped. The preserve will provide access to the Waikane Trail.<sup>66, 2000</sup>

The *State Parks of the Island of Oahu* describes Heeia Sate Park as providing picnicking and good views of Kaneohe Bay and Heeia Fishpond. The park is approximately 18.5 acres.

The Ulu Po Heiau State Monument is Ruins of a large open platform heiau can be seen at this monument. The monument also has a fine view of Kawainui marsh. The 8.3-acre facility is located off Kailua Road 0.4 mile northeast of Castle Hospital, Kailua.<sup>131, 2002</sup>

### ***Existing Problems, Issues and Opportunities***

See City and County of Honolulu Parks Summary for information.

### ***Future and Planned Usage***

A goal of the *General Plan: City and County of Honolulu* is to expand inventory of community based parks throughout the region.<sup>28, 1992</sup>

The *Koolau Poko Sustainable Communities Plan* states that the City has proposed to acquire Haiku Valley Nature Park, the former Omega Station site, from the U.S. Coast Guard and combine it with the adjoining Board of Water Supply parcel to create a nature and cultural preserve. The site includes Haiku Stairs and potential access to the Koolau Poko Trail Complex.<sup>66, 2000</sup>

### ***Future and Planned Requirements or Changes***

The *General Plan: City and County of Honolulu* lists the following future changes:

- Begin establishment of the Koolau Greenbelt.
- Complete establishment of Haiku Valley Nature Preserve.
- Provide improvements to Haiku Valley and Waihee Nature Preserves.
- Provide improvements to Waikane Nature Preserve.<sup>28, 1992</sup>

### ***Anticipated Costs for the Future***

See City and County of Honolulu Parks Summary for information.

### ***Problems, Issues and Opportunities Associated with Costs***

See City and County of Honolulu Parks Summary for information.

### ***Compare Visitor and Resident Impact***

See City and County of Honolulu Parks Summary for information.

### ***Major Assumptions***

See City and County of Honolulu Parks Summary for information.

## **City and County of Honolulu – Koolau Poko – Police, Fire and Emergency Services**

### ***Present Capacity and Usage***

According to the *Koolau Poko Sustainable Communities Plan*, Koolau Poko public safety facilities consist of police, fire, and ambulance stations. Police substations are located in Kaneohe and Kailua, both of which are located within their respective Regional Town Centers. The Honolulu Fire Department (HFD) operates fire stations in Kailua, Kaneohe, Waimanalo, and Kahaluu. The military maintains a fire station on the Marine Corps Base Hawaii, Kaneohe. To provide adequate response time throughout the region, a future fire station is planned in Kualoa. Ambulance service, staffed by the City's Emergency Medical Services Division, is provided from each of the HFD fire stations except Kahaluu, whose service area is covered from the Kaneohe station. An ambulance unit is planned in Kaaawa where an ambulance bay has been completed at the new Kaaawa fire station. <sup>66, 2000</sup>

See Koolau Loa Police, Fire and Emergency Medical Services Summary for information.

### ***Existing Problems, Issues and Opportunities***

See City and County of Honolulu and Koolau Loa Police, Fire and Emergency Medical Services Summaries for information

### ***Future and Planned Usage***

According to the *Koolau Poko Sustainable Communities Plan*, Planning Principles include:

- Maintaining present police and fire stations and developing a new fire station at Kualoa.
- Then approve new development only if adequate staffing and facilities for fire/ambulance and police protection will be provided. <sup>66, 2000</sup>

### ***Future and Planned Requirements or Changes***

According to the *Koolau Poko Sustainable Communities Plan*, the proposed Kaaawa fire station ambulance is intended to serve a portion of Koolaupoko. <sup>66, 2000</sup>

### ***Anticipated Costs for the Future***

See City and County of Honolulu and Koolau Loa Police, Fire and Emergency Medical Services Summaries for information.

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***Problems, Issues and Opportunities Associated with Costs***

See City and County of Honolulu and Koolau Loa Police, Fire and Emergency Medical Services Summaries for information.

***Compare Visitor and Resident Impact***

See City and County of Honolulu and Koolau Loa Police, Fire and Emergency Medical Services Summaries for information.

***Major Assumptions***

See City and County of Honolulu and Koolau Loa Police, Fire and Emergency Medical Services Summaries for information.

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## **City and County of Honolulu – Koolau Poko – Visitor Accommodations**

### ***Present Capacity and Usage***

Analysis of county documents shows that there are no major visitor accommodations in the Koolau Poko. Accommodations are limited to Bed and Breakfast and vacation rentals units located primarily in Lanikai that are unregulated and unaccounted for.

### ***Existing Problems, Issues and Opportunities***

Analysis of county documents shows that Bed and Breakfast and vacation rentals are unregulated.

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – Koolau Poko – Private Transportation**

### ***Present Capacity and Usage***

No documentation was uncovered regarding private transportation at the community level. Therefore, no evaluation was made.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – Koolau Poko – Energy Systems**

### ***Present Capacity and Usage***

See City and County of Honolulu Energy Systems Summary for information.

### ***Existing Problems, Issues and Opportunities***

See City and County of Honolulu Energy Systems Summary for information.

### ***Future and Planned Usage***

The *General Plan: City and County of Honolulu* lists a future plan to establish a long-range program for systematically relocating existing power lines underground.<sup>28, 1992</sup>

### ***Future and Planned Requirements or Changes***

See City and County of Honolulu Energy Systems Summary for information.

### ***Anticipated Costs for the Future***

See City and County of Honolulu Energy Systems Summary for information.

### ***Problems, Issues and Opportunities Associated with Costs***

See City and County of Honolulu Energy Systems Summary for information.

### ***Compare Visitor and Resident Impact***

See City and County of Honolulu Energy Systems Summary for information.

### ***Major Assumptions***

See City and County of Honolulu Energy Systems Summary for information.

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## **City and County of Honolulu – Koolau Poko – Sewer Systems**

### ***Present Capacity and Usage***

There was little to distinguish private sewer systems from public sewage at the community level. See City and County of Honolulu Sewage summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

## City and County of Honolulu – Koolau Poko – Coastal Water Quality

### ***Present Capacity and Usage***

The *Draft Kailua Bay Advisory Council Master Plan* describes the coastal water quality of the Koolau Poko Sustainable Community.

#### North and South Kaneohe Bay

North Kaneohe Bay watersheds are relatively undeveloped and its streams are not channelized for the most part. Stream flows track rainfall patterns and dominate freshwater input into Kaneohe Bay, influencing water quality. Localized heavy rainfall and storms passing over the Koolau Mountains often cause flash flooding. Waiahole Stream is now receiving water previously diverted to Central Oahu and flow is stronger than in almost any other stream in the district. Other than the mauka diversion, the stream itself is modified little.

Water quantity is one of the primary factors influencing the health of streams in the South Kaneohe Bay. The flow patterns of South Kaneohe Bay's streams are highly variable due to frequent flash flooding and the extreme variability of runoff rates.

#### Kailua

Sedimentation, erosion and poor circulation are key factors influencing water quality in the Kailua Watershed. Kawai Nui Marsh is a major wetland ecosystem that functions as a large sedimentation basin. The other major sediment retention basin in the Kailua watershed is Kaelepulu Pond (Enchanted Lake), which has a serious siltation problem.

Analyses of water quality in Kailua Bay indicate a raised bacterial count when Kaelepulu Stream, fed by Kaelepulu Pond and Kawai Nui Canal, is opened to the sea. Standards are violated all the way into the bay when the Kaelepulu Stream outlet at Kailua Bay is opened for flushing and flood control. Identified contributors to the water quality of Kailua Bay include Kaelepulu Pond, Kawai Nui Marsh, and seepage from Kailua Landfill (now closed).

The Ameron Quarry is located upstream of Kawai Nui Marsh and situated on Kapaa Stream. Despite strict permits to control the quarry's discharge runoff, large amounts of sediment have been transported from the quarry to Kapaa Stream in past storm events.

Kapaa Stream, descending through the Ameron Quarry, feeds directly into the Kawai Nui Marsh and has been designated one of four Water Quality Limited Segments in the Koolau Poko's.

Water quantity does not appear to be a significant problem in the Kailua watershed.

### **Waimanalo**

The Waimanalo watershed's fresh water sources come from the mountains, springs, and a diversion from Kailua. Waimanalo Stream, formerly called Puha Stream, serves as the primary freshwater drainage of the Waimanalo Basin into Waimanalo Bay. Waimanalo Stream runs through a predominately agricultural land use area and has been designated a Water Quality Limited Segment (WQLS).

All of the streams in Waimanalo suffer from poor circulation due to extensive plant overgrowth, lack of water, and dumping of trash.

The State Department of Agriculture (DOA) services about 30 farmers with an estimated minimum flow of 54 million gallons per month.<sup>104, 2002</sup>

The Final Technical Program Report describes the water quality pollutants in Koolau Poko.

- Sediment from soil erosion: Erosion occurs in the heavy rainfall, steep slope area in the conservation district of the Koolau mountains. Stream channels, cultivated agricultural fields, unvegetated urban areas, and construction sites all contribute to erosion.
- Fertilizers (nutrients), pesticides, herbicides and chemical residues from vehicles.
- Metallic residues from vehicles.
- Seepage from cesspools (nutrients).
- Paved, impervious areas that add to runoff and increase the amount of pollutants carried to water bodies.
- Animal and wildlife wastes (nutrients).
- Leaking sewer lines and sewage pumping station failures.(nutrients).
- Oil, paint, grease and car batteries.
- Litter.<sup>105, 2001</sup>

### ***Existing Problems, Issues and Opportunities***

The *Draft Kailua Bay Advisory Council Master Plan* describes the existing issues in the Koolau Poko Sustainable Community.

Northern Kaneohe Bay streams have had much of their water diverted to Central and Leeward Oahu by the Waiahole Ditch Tunnel System and has resulted in dried up springs in Waiahole and Kahaluu, and the reduction of both ground water storage and individual steam flows by as much as 20 to 60%. Water withdrawals from streams are one of the primary factors degrading the biological quality of streams not only in North Kaneohe Bay, but also throughout the Hawaiian Islands.

Rapid urbanization of Kaneohe Bay's watersheds has significantly altered the health of the Bay. Kaneohe Bay once faced threats of eutrophication and has been designated a Water Quality Limited Segment (WQLS). Although the health of the bay has shown signs of improvement since the removal of the sewage outfall in 1977, several serious problems remain:

Excess freshwater runoff in severe wet weather (at times producing a 5-foot lens of freshwater on the surface of Kaneohe Bay);

Heavy sediment loads;

High concentrations of suspended solids producing turbidity (muddiness);

High nitrogen concentrations.

The Hawaii Department of Health draft report has determined that Kawa has higher than acceptable levels of total nitrogen during the dry season, wet season, or storm flows. The major source of nitrogen appears to come from groundwater sources. High levels of these nutrients generally are indicators of non-point pollution discharges from such sources as excessive yard fertilizers, seasonal fruit fall, leaky sewers, and impacts from pets and feral animals in the watershed.

Two of the original reservoirs remain today. The poor condition of the earthen dam of the Kailua reservoir currently poses a threat to downstream residents. In order to make recommendations for future management, a comprehensive survey of all water features is needed along with current stream water assessments of water quantity.<sup>104, 2002</sup>

**Table 2.46 – Riparian Problems and Estimated Costs: 2001**

Table notes: Estimated cost: \$ = 0-25K; \$\$ = 25-100K; \$\$\$ = 100-250K; \$\$\$\$ = 250-1M; # = 1M greater [K= \$1,000 and M = \$2 million

| Problem  | Comments  | Proposed action   | Stakeholders             | Cost   |
|--|---|---|--------------------------|--------|
| Kaelepulu Stream - opening of the sand bar releases waters that may have high bacteria and nutrient loads. | Is this a health risk or is education needed noticing the public to avoid water contact following the sandbar openings.   | a. Monitor the water and advise users to avoid water contact after opening the sandbar; a. study improving water circulation in the Kailua water system; c. Implement recommendations of study. | C & C Env Svc, DOH, KBAC | \$     |
|  |   |   |                          | \$\$   |
|  |   |   |                          | \$\$   |
| Enchanted Lake, Kaelepulu Stream, and Kawai Nui Canal – Need clear statement of problems.                  | Flood and water quality problems continue. The low cost of the recommended remediation warrants investigation and evaluation of its impacts.  | Model and evaluate a system to improve mixing and circulation, thus, lower bacteria levels.   | Env Svc, DOH, COE, KBAC  | \$\$   |
| Golf Course - Olomana – evaluate and monitor its impact and use of BMPs to control water pollution.        | Ensure golf courses follow regulations established the 1990s- groundwater monitoring, environmental review, and grading requirements, though no obvious water quality problems presently exist. | Monitor golf course for compliance, including water quality monitoring.   | C&C Env Svc, DOH         | \$     |
| Landfills, military sites  | Metal concentrations up to 3 times background levels.   | Obtain baseline data or reports.  | USAF, EPA, DOH           | \$\$\$ |

Source: Kailua Bay Advisory Council - *Final Technical Program Report*

***Future and Planned Usage***

The *Draft Kailua Bay Advisory Council (KBAC) Master Plan* notes the future usages of the Koolau Poko Sustainable Community coastal water.

Kawa Stream is highly modified and, as a result, little remains of the natural habitat if sections of Kawa Stream were restored, it is likely to support a viable native community of aquatic macrofauna. Future plans for implementation include improving stream channels, reducing sediment and nutrient loads, and reducing the impact of introduced species.

Community groups are actively engaged in monitoring water quality of several of the streams in North Kaneohe Bay. The monitoring of water quality and stream biota (algae) is being conducted in Waiahole Stream in support of efforts to restore its ecological health. These restoration efforts in Waiahole watershed are of interest throughout Koolau Poko.

A Total Maximum Daily Load (TMDL) assessment for Kapaa Stream is currently underway by the State Department of Health (to be completed by 2003) and will contribute to the design of a plan for restorative action.

A joint implementation plan by the State Department of Land and Natural Resources and the U.S. Army Corps of Engineers will create more open water and additional sediment retention capacity by removing a large portion of the marsh grass "mat" in Kawai Nui Marsh.<sup>104, 2002</sup>

### ***Future and Planned Requirements or Changes***

The *Final Technical Program Report* notes sixteen recommendations to help mitigate observed problems and improve water quality:

- Koolau Poko Watershed Restoration Action Strategy.
- Education programs to reach Koolau Poko Watershed residents promoting individual practices which prevent pollution as well as to explain project undertakings.
- Continued funding of the Volunteer Water Quality Monitoring Program.
- Continuation of research and development in molecular biology by Dr. Maqsudal Alam.
- Temporary installation of "Living Machine" at Meadow Gold Dairy in Waimanalo.
- Composting of animal wastes in Waimanalo.
- Waimanalo Stream partial restoration.
- Reforestation of a hillside in Kahaluu.
- Revegetation of highway cuts and denuded slopes in Kahaluu and Kailua.
- Heeia Stream cleaning.
- Installation of grills in catch basin inlets in Kahaluu Stream watershed.
- Feasibility study of inducing water circulation from Oneawa Channel to Kawai Nui Canal.
- Dredge portions of Kaelepulu Pond (Enchanted Lake).
- Removal of mangrove in Waikalua Loko fishpond and Kawa Stream mouth.
- TMDL evaluation of Kapaa Stream.
- Cleaning of six streams.<sup>105, 2001</sup>

The *Draft Kailua Bay Advisory Council Master Plan* lists the greatest opportunity to improve the condition of the Waimanalo Stream exists in the middle stream sections of the Waimanalo Watershed.

- Increase the community’s ability to protect and enhance the stream;
- Improve the stream’s ability to move water, filter pollutants, and support aquatic life;
- Establish vegetated buffers next to streams;
- Improve wastewater treatment;
- Assure good agricultural management practices;
- Assure good animal waste management practices;
- Reduce nutrients and sediments in urban runoff; and
- Develop methods for stabilizing the stream channel to allow the stream to filter pollutants and support aquatic life.
- Implementing these recommendations can help return Waimanalo Stream back to a natural and functional stream.<sup>104, 2002</sup>

### ***Anticipated Costs for the Future***

The *Final Technical Program Report* includes the anticipated costs for recommended coastal water quality improvement programs.

Recommendation a. below provides funds for KBAC to do a Watershed Restoration Action Strategies (WRAS) for the entire watershed.

Recommendation b. embodies a proviso that if Community Trust for Kaneohe Bay’s application is granted, a portion of KBAC funds be allocated as matching funds for Community Trust for Kaneohe Bay’s (CTKB) project, and additional KBAC funds be allocated for a WRAS for the remainder of Koolau Poko.

|   |           |
|---|-----------|
| a. Cost .....                                 | \$410,000 |
| Possible Federal funds.....                   | \$150,000 |
| Net Cost to KBAC.....                         | \$260,000 |
| <br>  |           |
| b. Allocation to CTKB for matching funds..... | \$100,000 |
| WRAS for remainder of Koolau Poko.....        | \$310,000 |
| Possible Federal funds to KBAC.....           | \$ 50,000 |
| Net cost to KBAC.....                         | \$360,000 |

### ***Problems, Issues and Opportunities Associated with Costs***

The Final Technical Program Report notes that in November, 2000, when EPA approved Hawaii’s Implementation Plan for Polluted Runoff Control, they earmarked 20% of the grant funds for this program for the preparation of Watershed Restoration Action Strategies (WRAS). Preparation of a WRAS is extremely important because it is required to qualify Koolau Poko for project grants under the remaining 80% of the Federal funding.

Application from the Community Trust for Kaneohe Bay to the State for \$150,000 (50% of project cost) to do a WRAS for a portion of Koolau Poko (North Koolau Poko) has been noted. Federal funds for KBAC, if granted, may not be available for approximately nine months. <sup>105, 2001</sup>

### ***Compare Visitor and Resident Impact***

Analysis of county documents shows that Kaneohe Bay and Kailua Bay are heavily used ocean recreation areas. Residents and tourist alike visit the area to sightsee and participate in ocean recreational activities. Tour and equipment rental operators depend on the quality waters of the Bays for their tourism related product.

### ***Major Assumptions***

Analysis of county documents shows a major assumption to be that non-point source water runoff is a major contributor to coastal water pollution.

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## **City and County of Honolulu – Koolau Poko – Marine Ecosystem Health**

### ***Present Capacity and Usage***

There was little documentation for marine ecosystem health at the community level. See State of Hawaii Marine Ecosystem Health summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – Koolau Poko – Forestry / Green Space**

### ***Present Capacity and Usage***

There was little documentation for forestry / green space at the community level. See State of Hawaii Forestry / Green Space summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – Kooalu Poko – Air Quality**

### ***Present Capacity and Usage***

There was little documentation for air quality at the community level. See State of Hawaii Air Quality summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – Koolau Poko – Beach Erosion**

### ***Present Capacity and Usage***

There was little documentation for beach erosion at the community level. See State of Hawaii Beach Erosion summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – Koolau Poko – Invasive Species**

### ***Present Capacity and Usage***

There was little documentation for invasive species at the community level. See State of Hawaii Invasive Species summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – Koolau Poko – Other Natural / Scenic Resources**

### ***Present Capacity and Usage***

There was little documentation for riparian / wetlands, native species or other natural / scenic resources at the community level. See State of Hawaii Natural / Scenic Resources summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

## **City and County of Honolulu – East Honolulu – Water Quality and Quantity**

### ***Present Capacity and Usage***

As outlined in the *East Honolulu Sustainable Communities Plan* East Honolulu's municipal water is primarily supplied by the Board of Water Supply (BWS). In 1990, East Honolulu consumed 8.7mgd of potable water, or about six percent of the islandwide total. According to the BWS, East Honolulu will need a total of approximately 10.0mgd of potable water by the year 2020, in order to accommodate future residential and commercial growth.<sup>93, 2001</sup>

### ***Existing Problems, Issues and Opportunities***

Assure sufficient potable water supplies for future generations. See City and County of Honolulu Water Summary for information.

### ***Future and Planned Usage***

To meet future potable water demand, BWS has identified several potential well sites in the Waialae East and West aquifers, which could provide sufficient water supply for East Honolulu. The Waialae West aquifer has a sustainable yield of 4mgd of which 1.99mgd is permitted. The Waialae East aquifer has a sustainable yield of 2mgd of which 0.6mgd is permitted. The balance of 3.41mgd available supply consists of low yield, very expensive wells.

BWS long range plan is to develop new Windward water sources to serve Windward and East Honolulu users. This source development will allow redistribution of water presently pumped to East Honolulu from existing Pearl Harbor and Honolulu sources.<sup>93, 2001</sup>

### ***Future and Planned Requirements or Changes***

The *East Honolulu Sustainable Communities Plan* lists general policies pertaining to East Honolulu's potable and non-potable water systems.

- Integrate management of all potable and non-potable water sources, including groundwater, stream water, storm water, and effluent, following State and City legislative mandates.
- Adopt and implement water conservation practices in the design of new developments and the modification of existing uses, including landscaped areas.
- Conserve the use of potable water by implementing the following measures, as feasible and appropriate:
  - Low-flush toilets, flow constrictors, and other water conserving devices in commercial and residential developments.
  - Indigenous, drought-tolerant plant material and drip irrigation systems in landscaped areas.

- The use of tertiary-treated recycled water for the irrigation of golf courses and other landscaped areas where this would not adversely affect potable groundwater supply.<sup>93, 2001</sup>

### ***Anticipated Costs for the Future***

See State and City and County of Honolulu Water Summary for information.

### ***Problems, Issues and Opportunities Associated with Costs***

See State and City and County of Honolulu Water Summary for information.

### ***Compare Visitor and Resident Impact***

See State and City and County of Honolulu Water Summary for information.

### ***Major Assumptions***

The General Plan population share for East Honolulu ranges from 5.3 percent to 5.8 percent, which is consistent with the projected population.<sup>93, 2001</sup>

## City and County of Honolulu – East Honolulu – Sewage

### ***Present Capacity and Usage***

According to the *East Honolulu Sustainable Communities Plan* East Honolulu, which utilizes centralized waste collection and treatment is divided into two wastewater service areas. The western portion, from Kahala to Niu Valley, is part of the East Mamala Bay service area. Wastewater from this service area is pumped to the Sand Island Wastewater Treatment Plant (WWTP) via the Ala Moana wastewater pump station. From Kuliouou eastward, sewage is pumped to the privately operated East Honolulu Wastewater Treatment Plant.<sup>93, 2001</sup>

**Table 2.47 -- Watershed Capacity and Usage**

| <b>Treatment Plant</b> | <b>Capacity</b> | <b>Usage</b> |
|------------------------|-----------------|--------------|
| <b>Sand Island</b>     | 82.0 MGD        | 72.9 MGD     |
| <b>East Honolulu</b>   | 5.2 MGD         | 3.8 MGD      |

**Source:** *East Honolulu Sustainable Communities Plan*

#### SAND ISLAND WASTEWATER TREATMENT PLANT

In accordance with the *East Honolulu Sustainable Communities Plan* the Sand Island WWTP has a design capacity of 82mgd average flow and is operating at approximately 89 percent capacity. Some components of the collection system, including sewer lines and pump stations, are at or close to 100 percent capacity. Wastewater flow generated in East Honolulu, specifically from the Kahala-Niu Valley sewer shed, currently comprises only a very small portion of the total flow to Sand Island, and is projected to increase by less than 3 percent between 1995 and 2020.

Flows from Kuliouou Valley are currently pumped via the Kuliouou Wastewater Pump Station (WWPS) to the Hawaii Kai system under an existing agreement between the City and East Honolulu Community Services. The average daily flow from the Kuliouou WWPS is about 0.50 mgd and is not projected to increase over the next 25 years. An engineering study is being conducted to evaluate the most cost-effective approach for future disposal of Kuliouou flows. Primary objectives include prevention of wastewater spills and adequate collection and transmission capacity to accommodate projected high rainfall/peak flow conditions.<sup>93, 2001</sup>

#### EAST HONOLULU WASTEWATER TREATMENT PLANT

It is stated in the *East Honolulu Sustainable Communities Plan*, 2001, that the privately owned East Honolulu WWTP is required by the State P.U.C. The State Public Utilities Commission requires that the plant accept wastewater from public or private sources in the service area.

The plant primarily collects wastewater from residential sources in the Hawaii Kai, Kuliouou, Paiko, and Portlock communities. A portion of the wastewater is

generated by commercial users around Koko Marina. The population served by the plant is approximately 37,000.

The East Honolulu WWTP is a partial-tertiary treatment facility. The plant's design capacity is 5.2 mgd with current flows at approximately 3.8 mgd. The treated effluent is discharged via a 36-inch outfall, 1,400 feet off Sandy Beach at depths between 29 and 45 feet. The receiving waters are classified as "Class A" (generally dry, open coastal water) and "Class II" (marine bottom type) by the State Department of Health. Biosolids from the plant are dried and taken to a municipal landfill. The WWTP at present has a 2 mgd filtration and disinfection facility, which produces R-1, rated recycled water for irrigation purposes. As of October 27, 1997, the State authorized the Hawaii Kai Golf Course to use this recycled water from the East Honolulu WWTP for irrigation. <sup>93, 2001</sup>

### ***Existing Problems, Issues and Opportunities***

See City and County of Honolulu Sewage Summary for information.

### ***Future and Planned Usage***

Implementation of the *East Honolulu Sustainable Communities Plan* policies and guidelines will require review of the Wastewater Management Design Standards and the 1990 Revised Ordinances of Honolulu, Chapter 14 (relating to sewer services). It should remain under private operation under the regulatory supervision of the State Public Utilities Commission and Department of Health unless there is a compelling reason and a mutually satisfactory agreement between the City and the private operator to incorporate this treatment plant within the municipal wastewater treatment system.

Adequate horizontal separations and landscape elements (e.g. berms and windrows) should be provided between the East Honolulu WWTP and adjacent residential designated areas. To mitigate negative impacts of the wastewater treatment plant, site-specific studies should be conducted to determine the width of the buffer zone and specific types of landscaping elements to use. <sup>93, 2001</sup>

### ***Future and Planned Requirements or Changes***

According to the *East Honolulu Sustainable Communities Plan* the Department of Health Office of Environmental Planning projects that between the year 1995 and 2020 nearly all of the increases in wastewater flow at the Sand Island WWTP will be from the Sand Island sewer shed.

The following planned requirements were outlined in the *East Honolulu Sustainable Communities Plan*:

- Connect all facilities producing wastewater in East Honolulu to a publicly-regulated or municipal sewer service system;
- Implement water recycling as a water conservation measure; and

- Provide buffer zones and landscape elements between the East Honolulu WWTP and adjacent residential designated areas to provide a more livable community.<sup>93, 2001</sup>

### ***Anticipated Costs for the Future***

See State and City and County of Honolulu Sewage Summary for information.

### ***Problems, Issues and Opportunities Associated with Costs***

See State and City and County of Honolulu Sewage Summary for information.

### ***Compare Visitor and Resident Impact***

According to the *East Honolulu Sustainable Communities Plan* East Honolulu is not heavily impacted by the visitors except for Kahala Mandarin area. No figures are available for B&B's or other tourist accommodations.<sup>93, 2001</sup>

### ***Major Assumptions***

See State and City and County of Honolulu Sewage Summary for information.

## **City and County of Honolulu – East Honolulu – Solid Waste Disposal**

### ***Present Capacity and Usage***

According to the *East Honolulu Sustainable Communities Plan* collected refuse is ultimately disposed of either in a waste-to-energy incineration facility or a sanitary landfill. There are presently no convenience centers within East Honolulu that accept large bulky items. The closest facilities for the disposal of oversized items are at Kapaa and Waimanalo. There are no plans to locate a convenience center, another transfer station, or a landfill operation in East Honolulu.<sup>93, 2001</sup>

### ***Existing Problems, Issues and Opportunities***

See Hawaii State and City and County of Honolulu Solid Waste Summaries for information.

### ***Future and Planned Usage***

See Hawaii State and City and County of Honolulu Solid Waste Summaries for information.

### ***Future and Planned Requirements or Changes***

The following policies stated in the *East Honolulu Sustainable Communities Plan* apply to solid waste handling and disposal in East Honolulu:

- As waste management and technological innovations occur, East Honolulu can and should play a part in the City's long-term efforts to establish more efficient waste diversion and collection systems. However, since the region is not expected to contribute significantly to future increases in Oahu's solid waste management demands and does not contain sites suitable for the processing or disposal of solid waste on an islandwide scale, no short-term significant program changes are planned.
- Promote the recycling of waste materials by providing expanded collection facilities and services, and public outreach and education programs.
- Expand the use of automated refuse collection in residential areas.<sup>93, 2001</sup>

### ***Anticipated Costs for the Future***

See Hawaii State and City and County of Honolulu Solid Waste Summaries for information.

### ***Problems, Issues and Opportunities Associated with Costs***

See Hawaii State and City and County of Honolulu Solid Waste Summaries for information.

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### ***Compare Visitor and Resident Impact***

The *East Honolulu Sustainable Communities Plan* states that the East Honolulu area is not heavily impacted by visitors to Honolulu aside from the Kahala Mandarin area. Visitors to this area utilize bed and breakfast's or other tourist accommodations, however little information is available regarding B&B's.<sup>93, 2001</sup>

### ***Major Assumptions***

See Hawaii State and City and County of Honolulu Solid Waste and East Honolulu Water Summaries for information.

## **City and County of Honolulu – East Honolulu – Storm Water**

### ***Present Capacity and Usage***

The *East Honolulu Sustainable Communities Plan* describes the storm water drainage in East Honolulu. The streams that drain the valleys of East Honolulu include Waialae Iki Stream, Wiliwilinui Stream, Wailupe Stream, Niu Stream, and Kuliouou Stream. These streams begin in the Koolau Range and discharge into Maunaloa Bay. The drainage basins are long and narrow and range from 0.3 to 3.2 square miles in area. The upper reaches of the basins are very steep, while the lower reaches are almost flat.

In the area between Kamehame Ridge and the Hawaii Kai Golf Course, a 40-foot wide concrete channel alters the natural drainage pattern. Water collected from this area is carried along the drainageway that passes under Kalanianaʻole Highway and into Kailili Inlet.<sup>93, 2001</sup>

### ***Existing Problems, Issues and Opportunities***

The *East Honolulu Sustainable Communities Plan* notes that Niu Valley, Kuliouou Valley, and Hahaione Valley drainageways have been prone to flooding during more intense rainstorms, debris clogged bridges and culverts contributed significantly to the flooding problems. Wailupe Stream faces similar drainage problems.<sup>93, 2001</sup>

### ***Future and Planned Usage***

The *East Honolulu Sustainable Communities Plan* notes principles to guide the maintenance and improvement of East Honolulu's drainage systems include:

- Emphasize retaining or detaining storm water in debris free basins for gradual release into the ground as the preferred strategy for management of storm water.
- To the extent possible, integrate planned improvements to the drainage system into the regional open space network by emphasizing the use of retention basins, creation of passive recreational areas, and recreational access for pedestrians and bicycles without jeopardizing public safety. Hardening of stream channels should be designed and made in a manner which protects natural resource and aesthetic values of the stream to the greatest extent possible.<sup>93, 2001</sup>

### ***Future and Planned Requirements or Changes***

General policies pertaining to East Honolulu's drainage system are listed in the *East Honolulu Sustainable Communities Plan*.

- A comprehensive study of local flooding and drainage problems should be developed and should include a phased plan for improvements.

- Promote drainage system design, which emphasizes control and minimization of non-point source pollution and the retention of storm water on-site and in wetlands.
- View storm water as a potential irregular source of water for recharge of the aquifer that should be retained for absorption rather than quickly moved to coastal waters.
- Select natural and man-made vegetated drainageways and retention basins as the preferred solution to drainage problems wherever they can promote water recharge, help control nonsource pollutants, and provide passive recreation benefits.
- Keep drainageways clear of debris to avoid the flooding problems that have occurred in the past.
- Channeling 8,900 feet of Wailupe Stream from the mouth to the existing boulder basin, enlarging the existing boulder basin, and constructing a new debris basin in Kului Gulch.<sup>93, 2001</sup>

### ***Anticipated Costs for the Future***

See State and City and County of Honolulu Storm Water Summary for information.

### ***Problems, Issues and Opportunities Associated with Costs***

See State and City and County of Honolulu Storm Water Summary for information.

### ***Compare Visitor and Resident Impact***

See State and City and County of Honolulu Storm Water Summary for information.

### ***Major Assumptions***

See State and City and County of Honolulu Storm Water and East Honolulu Water Summaries for information. Also see the Introduction.

## **City and County of Honolulu – East Honolulu – Roads**

### ***Present Capacity and Usage***

The *East Honolulu Sustainable Communities Plan* describes the roadway system in the region. The only major roadway arterial in East Honolulu is Kalanianaʻole Highway (State Highway 72), which links Honolulu to the communities of East Honolulu and is also a scenic, secondary route for travel between Kailua/Waimanalo and Honolulu.

Portions of the highway were recently widened and upgraded so that the entire 4.2-mile stretch between Ainakoa Avenue and Keahole Street consists of six lanes (three lanes in each direction). One of the lanes is designed as a High Occupancy Vehicle (HOV) contra-flow lane, thus providing four Honolulu bound lanes during the morning peak between West Halemaumau Street and Ainakoa Avenue. Other improvements made to this section of the highway include left turn lanes, bus turnouts, improved traffic control systems, and improved lighting.

Major roadway collectors in East Honolulu are those leading from Kalanianaʻole Highway into the ridge and valley neighborhoods. Important intersections include, but are not limited to, Kalaniiki Street, West Hind Drive, Hawaii Kai Drive, Keahole Street, and Lunalilo Home Road.<sup>93, 2001</sup>

### ***Existing Problems, Issues and Opportunities***

The *East Honolulu Sustainable Communities Plan* states that Hawaii Kai Drive runs parallel to Kalanianaʻole Highway through parts of Hawaii Kai. However, because a section of the planned route for Hawaii Kai Drive in the Kamilonui Valley area has not been completed, it does not function as an additional mauka access route linking Maunalua Bay to Kalama Valley.<sup>93, 2001</sup>

### ***Future and Planned Usage***

According to the Oahu Metropolitan Planning Organization (OMPO), a joint City-State agency, no major projects are planned for East Honolulu's roads for the immediate term.

### ***Future and Planned Requirements or Changes***

The *East Honolulu Sustainable Communities Plan* reports that in the 2001- 2005 time period, the ORTP includes plans to extend the morning HOV lane from West Halemaumau Street to Keahole Street. The existing park-and-ride lot at Keahole Street would be served by this extension. In the 2006-2020 period, plans call for the addition of one westbound lane from Laukahi Street to the Kilauea Avenue off-ramp.

Desirable to complete uncompleted section of Hawaii Kai Drive to provide for more direct travel from Lunalilo Home Road to Kamilonui Place and to create a new bicycle route.<sup>93, 2001</sup>

***Anticipated Costs for the Future***

See City and County of Honolulu Roads Summary for information.

***Problems, Issues and Opportunities Associated with Costs***

See City and County of Honolulu Roads Summary for information.

***Compare Visitor and Resident Impact***

The roads and thoroughfares are primarily utilized by residents. Visitor use is limited to travel to and from hotel accommodations and access points of interests such as Hanauma Bay. See *City and County of Honolulu Roads Summary* for information.

***Major Assumptions***

See City and County of Honolulu Roads and East Oahu Water Summaries for information.

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## **City and County of Honolulu – East Honolulu – Airports**

### ***Present Capacity and Usage***

Analysis of county documents shows there are no airports in the East Honolulu region.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

## **City and County of Honolulu – East Honolulu – Harbors**

### ***Present Capacity and Usage***

The *East Honolulu Sustainable Communities Plan* describes the privately owned and operated Hawaii Kai Marina. The 260-acre Hawaii Kai Marina provides protected water for small sail and motor craft, water skiing, and fishing. Residences fronting the marina have launching ramps and mooring facilities. In addition, there are boating facilities adjacent to the Koko Marina Shopping center that can accommodate boats up to 40 feet in length. The Hawaii Kai Marina also serves as the focal point for commercial activity in Hawaii Kai. East Honolulu's three largest commercial centers, the Hawaii Kai Towne Center, Hawaii Kai Shopping Center, and Koko Marina Shopping Center, front the marina on the east and west sides. The Hawaii Kai Marina contributes to the open space system by providing recreational value and visual relief from adjacent urban uses. It also has a cooling effect and thus offers climatic benefits for commercial and residential uses that front the water.<sup>93, 2001</sup>

### ***Existing Problems, Issues and Opportunities***

The *East Honolulu Sustainable Communities Plan* lists opportunities for the Hawaii Kai Marina.

- Enhance the recreational value of this open space feature by improving facilities in support of boating and providing additional pedestrian access to the edges, and to the extent possible, around the commercial frontages of the marina by way of a pedestrian and bike path.
- Link the Hawaii Kai Towne Center and the Hawaii Kai Shopping Center with a pedestrian bridge in order to provide convenient access between the two commercial centers.
- Improve pedestrian access to and along the marinas edge. A shuttle boat transport service should be considered as a means of transporting people across the marina and providing them with easy and convenient access to various waterfront locations.<sup>93, 2001</sup>

### ***Future and Planned Usage***

Analysis of county documents shows that the Hawaii Kai Marina is privately owned and operated. Information on future costs was not available from county documents.

### ***Future and Planned Requirements or Changes***

Analysis of county documents shows that the Hawaii Kai Marina is privately owned and operated. Information on future costs was not available from county documents.

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### ***Anticipated Costs for the Future***

Analysis of county documents shows that the Hawaii Kai Marina is privately owned and operated. Information on future costs was not available from county documents.

### ***Problems, Issues and Opportunities Associated with Costs***

Analysis of county documents shows that the Hawaii Kai Marina is privately owned and operated. Information on problems, issues and opportunities with future costs was not available from county documents.

### ***Compare Visitor and Resident Impact***

Analysis of county documents shows that residents and visitors use the Hawaii Kai Marina. Tour operators use the Marina as a base for jet ski, parasailing, kayaking and other ocean recreational operations.

### ***Major Assumptions***

Analysis of county documents shows that the Hawaii Kai Marina is privately owned and operated. Information on future costs was not available from county documents.

## City and County of Honolulu – East Honolulu – Parks

### *Present Capacity and Usage*

East Honolulu contains eight island-based parks that are maintained by the Department of Parks and Recreation. A brief description of East Honolulu’s regional parks, and various beach parks is provided below.

**Table 2.48 -- Department of Parks and Recreation Island-Based Parks in East Honolulu**

| Park Type/Name               | Acreage        |
|------------------------------|----------------|
| <b>Regional Parks</b>        |                |
| Koko Head Regional Park      | 951.4          |
| <b>Beach/Shoreline Parks</b> |                |
| Maunaloa Bay Beach Park      | 5.4            |
| Sandy Beach Park             | 22.6           |
| Kawaikui Beach Park          | 4.1            |
| Kuliouou Beach Park          | 3.2            |
| Waialae Beach Park           | 4.4            |
| Wailupe Beach Park           | 1.2            |
| Subtotal                     | 41.0           |
| <b>Nature Parks/Reserves</b> |                |
| Hanauma Bay Nature Park      | 50.0           |
| <b>Botanical Gardens</b>     |                |
| Koko Crater Botanical Garden | 200.0          |
| <b>Total</b>                 | <b>1,242.3</b> |

Source: *East Honolulu Sustainable Communities Plan*

East Honolulu has approximately 120 acres of community-based parks.

**Table 2.49 -- Department of Parks and Recreation Community-Based Parks in East Honolulu**

| Park Type/Name                    | Acreage | Park Type/Name                       | Acreage      |
|-----------------------------------|---------|--------------------------------------|--------------|
| <b>District Parks</b>             |         | <b>Neighborhood Parks, continued</b> |              |
| Koko Head District Park           | 40.0    | Kuliouou Neighborhood Park           | 4.4          |
| <b>Community Parks</b>            |         | Nehu Neighborhood Park               | 1.3          |
| Kalama Valley Community Park      | 6.0     | Niu Valley Neighborhood Park         | 2.1          |
| Kamilo Iki Community Park         | 18.5    | Waialae Iki Neighborhood Park        | 9.9          |
| Aina Haina Community Park         | 6.2     | Wailupe Valley Neighborhood Park     | 2.5          |
| Subtotal                          | 30.7    | Subtotal                             | 46.8         |
| <b>Neighborhood Parks</b>         |         | <b>Mini Parks</b>                    |              |
| Aina Koa Neighborhood Park        | 2.4     | Koko Kai Park                        | 0.6          |
| Hahaione Neighborhood Park        | 4.1     | Kamole Mini Park                     | 2.2          |
| Hahaione Valley Neighborhood Park | 6.2     | Kokee Park                           | 0.5          |
| Kamilo Iki Neighborhood Park      | 7.2     | Subtotal                             | 3.3          |
| Koko Head Neighborhood Park       | 6.8     | <b>Total</b>                         | <b>120.8</b> |

Source: *East Honolulu Sustainable Communities Plan*

The 1,264-acre Koko Head Regional Park encompasses the most popular recreation areas in East Honolulu, including: Halona Blowhole Lookout, Koko Crater Stables, Koko Head Rifle Range, Sandy Beach Park, Hanauma Bay Nature Park, Koko Crater Botanical Garden, Hawaii Job Corps Center and Koko Head District Park.<sup>93, 2001</sup> The Department of Parks and Recreation reported the Koko Crater Botanical Garden had close to 8,000 visitors in 2000.<sup>52, 2001</sup>

The *State Parks of the Island of Oahu* describes Makapuu Point State Wayside that provides a one-mile hike along the former roadway to the lighthouse. The hike provides sweeping views of the southeastern Oahu coastline and depending on the time of year whales may be visible. The 38-acre wayside is located off Kalaniana'ole Highway from either Waimanalo or Hawaii Kai.<sup>131, 2002</sup>

### ***Existing Problems, Issues and Opportunities***

The *East Honolulu Sustainable Communities Plan* notes the following existing issues in the region:

- The distribution of community-based park lands within East Honolulu is slightly uneven. The Hawaii Kai Neighborhood Board area has a surplus of approximately 34 acres, while the Kuliouou-Kalani Iki Neighborhood Board area has a deficit of approximately 6 acres.
- There is a surplus of approximately 26 acres of community-based parks in the region.
- Expansion of community-based park lands is possible in Hawaii Kai, but is limited in the Kuliouou-Kalani Iki Neighborhood Board area by the lack of available land.
- Expand the availability of recreational facilities oriented to a younger population in the Kuliouou-Kalani Iki area, by jointly, with the Department of Education (DOE), using and improving elementary and intermediate school recreational facilities as community-based parks.<sup>93, 2001</sup>

### ***Future and Planned Usage***

The *East Honolulu Sustainable Communities Plan* states that DPR has no current plans to acquire additional land for community-based park development in the region. Any new park areas would thus be provided pursuant to the Park Dedication Ordinance in conjunction with private developments.

Expansion of the 40-acre Koko Head District Park to 59 acres is proposed by incorporating the adjacent Job Corps site. In East Honolulu, this is the most appropriate location for sports and active recreation facilities.

A 354-acre scenic shoreline area is proposed in the Queens Beach/Makapuu Head region of East Honolulu adjacent to Koko Head Regional Park.<sup>93, 2001</sup>

### ***Future and Planned Requirements or Changes***

The *East Honolulu Sustainable Communities Plan* lists the following planned changes for parks in the region:

- Preserve and enhance Koko Head Regional Park's coastal-oriented recreational and educational resources by implementing when funding is available, the following:
  - Convert the portion of Kalaniana'ole Highway between Lunalilo Home Road and Sandy Beach to a 25-mile per hour scenic roadway.
  - Maintain and facilitate access to the area's important fishing resources.
  - Develop new trails in and around Koko Crater.
  - Minimize adverse lighting impacts to aquatic life and avifauna, as well as adverse aesthetic impacts.
  - Maintain Koko Crater Botanical Garden with drought tolerant plant species.
- Develop Ka Iwi scenic shoreline in a manner which preserves the areas natural scenic quality and provides educational and passive recreation opportunities.<sup>93, 2001</sup>

### ***Anticipated Costs for the Future***

See State and City and County of Honolulu Parks Summary for information.

### ***Problems, Issues and Opportunities Associated with Costs***

The *East Honolulu Sustainable Communities Plan* states that DPR has no current plans to acquire additional land for community-based park development in the region. Any new park areas would thus be provided pursuant to the Park Dedication Ordinance in conjunction with private developments.<sup>93, 2001</sup>

### ***Compare Visitor and Resident Impact***

See State and City and County of Honolulu Parks Summary for information.

### ***Major Assumptions***

See State and City and County of Honolulu Parks and East Honolulu Water Summaries for information.

## City and County of Honolulu – East Honolulu – Police, Fire and Emergency Services

### ***Present Capacity and Usage***

According to the *East Honolulu Sustainable Communities Plan*, the Honolulu Police Department (HPD) services East Honolulu out of the Main station on Beretania Street. Currently, 160 staff and officers are assigned to the area from Punahou Street to Makapuu.<sup>93, 2001</sup>

The *Finance Division* of the Police Department reports that Police Districts and Planning Districts are not the same. Honolulu's police district is divided into smaller units than the planning district, while outlying areas are consolidated under larger districts.<sup>165, 2002</sup>

The *Honolulu Police Department 2000 Annual Report* describes the police districts.

District 7 encompasses East Honolulu from Punahou Street to Makapuu Point, excluding Waikiki.

- A special detail was formed in 1995 to deal with crimes, especially thefts in the beach areas between Hanauma Bay and Sandy Beach, primarily through area surveillance and aggressive enforcement action. Since the formation of this detail, thefts in the area have declined every year.<sup>53, 2000</sup>

The Honolulu Fire Department (HFD) operates fire stations in Hawaii Kai and Wailupe. The Hawaii Kai station is equipped with five-person engine and ladder trucks and a rescue boat. The Wailupe station has a five-person engine. In addition, the Kaimuki station also services part of the Kahala area. HFD has no immediate plans to establish any additional new stations in East Honolulu.

Ambulance service, staffed by the City's Emergency Medical Services Division, is currently provided from each of the fire stations.<sup>93, 2001</sup>

### ***Existing Problems, Issues and Opportunities***

According to the *East Honolulu Sustainable Communities Plan*, additional land area to provide for adequate new facility/ambulance space will be needed for the EMS crew at the Hawaii Kai Fire Station in the near future. Also, as regional recreational activities along this eastern corridor of Oahu increase, emergency medical services may need to be reevaluated.

HPD is now in the planning stages for a new station in Aina Haina. The facility would be located on City-owned land behind Aina Haina Elementary School.

As land use changes occur through development or redevelopment of older areas, as the demographic profile of the region changes, and as aquatic

recreational activities increase, the facilities and staff needed by the HFD to serve East Honolulu may warrant reassessment.<sup>93, 2001</sup>

### ***Future and Planned Usage***

See City and County of Honolulu Police, Fire and Emergency Medical Services Summary for information.

### ***Future and Planned Requirements or Changes***

According to the *East Honolulu Sustainable Communities Plan*, the following general policy pertains to public safety facilities:

- Provide adequate staffing and facilities to ensure effective and efficient delivery of basic governmental service and protection of public safety.<sup>93, 2001</sup>
  - Maintain Police and Fire/Ambulance Stations. After the proposed new police station at Aina Haina is completed, a permanent base of operations for the eastern sector of Oahu will be established. As future needs arise, the development of a substation (collocated with other emergency medical and transportation services) along an entry to Hawaii Kai, may warrant consideration to more effectively and quickly respond with public safety and medical services.
  - Adequate Police and Fire/Ambulance Protection. Approve new development only if adequate staffing and facilities for fire/ambulance and police protection will be provided.<sup>93, 2001</sup>

### ***Anticipated Costs for the Future***

See City and County of Honolulu Police, Fire and Emergency Medical Services Summary for information.

### ***Problems, Issues and Opportunities Associated with Costs***

A review of the long-term plan is recommended prior to implementing any changes to facility staffing. See City and County of Honolulu Police, Fire and Emergency Medical Services Summary for information.

### ***Compare Visitor and Resident Impact***

See City and County of Honolulu Police, Fire and Emergency Medical Services Summary for information.

### ***Major Assumptions***

See City and County of Honolulu Police, Fire and Emergency Medical Services Summary for information.

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## **City and County of Honolulu – East Honolulu – Visitor Accommodations**

### ***Present Capacity and Usage***

Analysis of county documents shows that there is one major visitor accommodation in the East Honolulu. Most accommodations are limited to Bed and Breakfast and vacation rentals units that are unregulated and unaccounted for.

### ***Existing Problems, Issues and Opportunities***

Analysis of county documents shows that Bed and Breakfast and vacation rentals are unregulated.

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – East Honolulu – Private Transportation**

### ***Present Capacity and Usage***

No documentation was uncovered regarding private transportation at the community level. Therefore, no evaluation was made.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – East Honolulu – Energy Systems**

### ***Present Capacity and Usage***

No documentation was uncovered regarding energy systems at the community level. Therefore, no evaluation was made. See City and County of Honolulu Energy Systems summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – East Honolulu – Sewer Systems**

### ***Present Capacity and Usage***

There was little to distinguish private sewer systems from public sewage at the community level. See City and County of Honolulu Sewage summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – East Honolulu – Coastal Water Quality**

### ***Present Capacity and Usage***

There was little documentation for coastal water quality at the community level. See State of Hawaii Coastal Water Quality summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – East Honolulu – Marine Ecosystem Health**

### ***Present Capacity and Usage***

There was little documentation for marine ecosystem health at the community level. See State of Hawaii Marine Ecosystem Health summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – East Honolulu – Forestry / Green Space**

### ***Present Capacity and Usage***

There was little documentation for forestry / green space at the community level. See State of Hawaii Forestry / Green Space summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – East Honolulu – Air Quality**

### ***Present Capacity and Usage***

There was little documentation for air quality at the community level. See State of Hawaii Air Quality summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – East Honolulu – Beach Erosion**

### ***Present Capacity and Usage***

There was little documentation for beach erosion at the community level. See State of Hawaii Beach Erosion summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – East Honolulu – Invasive Species**

### ***Present Capacity and Usage***

There was little documentation for invasive species at the community level. See State of Hawaii Invasive Species summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

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## **City and County of Honolulu – East Honolulu – Other Natural / Scenic Resources**

### ***Present Capacity and Usage***

There was little documentation for riparian / wetlands, native species or other natural / scenic resources at the community level. See State of Hawaii Natural / Scenic Resources summary.

### ***Existing Problems, Issues and Opportunities***

N/A

### ***Future and Planned Usage***

N/A

### ***Future and Planned Requirements or Changes***

N/A

### ***Anticipated Costs for the Future***

N/A

### ***Problems, Issues and Opportunities Associated with Costs***

N/A

### ***Compare Visitor and Resident Impact***

N/A

### ***Major Assumptions***

N/A

| ID | TITLE  | DATE         | AGENCY   |
|----|--|--------------|--|
| 1  | Maui Community Plan Update Infrastructure Assessment                                   | September-92 | Maui - Department of Planning                    |
| 2  | West Maui Master Plan for Wastewater Collection, Treatment and Disposal                | June-90      | Maui - Department of Public Works                |
| 3  | Maui Public Facilities Assessment; Final Report  | July-92      | Maui - Department of Planning                    |
| 4  | Kauai General Plan   | November-00  | Kauai - Department of Planning                   |
| 6  | State Land Use District Boundary Review: Oahu  | January-92   | State - Office of Planning                       |
| 8  | State Land Use District Boundary Review: Executive Summary, Kauai                      | January-92   | State - Office of Planning                       |
| 9  | State Land Use District Boundary Review: Kauai   | January-92   | State - Office of Planning                       |
| 10 | State Land Use District Boundary Review: Executive Summary: Maui, Molokai, Lanai       | January-92   | State - Office of Planning                       |
| 11 | State Land Use District Boundary Review: Maui, Molokai, Lanai                          | January-92   | State - Office of Planning                       |
| 12 | State Land Use District Boundary Review: Executive Summary, Hawaii                     | January-92   | State - Office of Planning                       |
| 13 | State Land Use District Boundary Review: Hawaii  | January-92   | State - Office of Planning                       |
| 14 | DUPLICATE The General Plan of the County of Maui: 1990 Update                          | June-90      | Maui - Department of Planning                    |
| 15 | DUPLICATE The General Plan of the County of Maui: 1990 Update                          | November-90  | Maui - Department of Planning                    |
| 16 | Lahaina Community Plan of the County of Maui   | December-83  | Maui - Department of Planning                    |
| 17 | Kahoolawe Community Plan of County of Maui   | May-95       | Maui - Department of Planning                    |
| 18 | Kihei-Makena Community Plan: County of Maui  | March-98     | Maui - Department of Planning                    |
| 19 | DUPLICATE The General Plan of the County of Maui: 1990 Update                          | September-90 | Maui - Department of Planning                    |
| 20 | Maui County Community Plan Update Program Socio-Economic Forecast Report               | July-92      | Maui - Department of Planning                    |
| 21 | DUPLICATE - General Plan 1990: County of Maui  | January-90   | Maui - Department of Planning                    |
| 22 | Maui County Community Plan Update Program Socio-Economic Forecast Report: Final Report | January-94   | Maui - Department of Planning                    |
| 23 | DUPLICATE - Kihei-Makena Community Plan: County of Maui                                | March-98     | Maui - Department of Planning                    |
| 24 | DUPLICATE Molokai Community Plan: County of Maui                                       | January-84   | Maui - Department of Planning                    |
| 25 | DUPLICATE - Makawao-Pukalani-Kula Community Plan: County of Maui                       | October-81   | Maui - Department of Planning                    |
| 26 | DUPLICATE - Lanai Community Plan: County of Maui                                       | April-83     | Maui - Department of Planning                    |
| 27 | County of Hawaii General Plan Revision   | December-01  | Hawaii - Department of Planning                  |
| 28 | General Plan: City and County of Honolulu  | January-92   | Honolulu - Department of Planning and Permitting |

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| 29 | The General Plan of the County of Maui   | April-93     | Maui - Department of Planning                    |
| 30 | Lanai Community Plan   | December-98  | Maui - Department of Planning                    |
| 31 | The Updated Wailuku-Kahului Community Plan   | December-00  | Maui - Department of Planning                    |
| 32 | DUPLICATE Kihei-Makena Community Plan  | March-98     | Maui - Department of Planning                    |
| 33 | Makawao-Pukalani-Kula Community Plan   | July-96      | Maui - Department of Planning                    |
| 34 | Paia-Haiku Community Plan  | May-95       | Maui - Department of Planning                    |
| 35 | West Maui Community Plan   | February-96  | Maui - Department of Planning                    |
| 36 | Hana Community Plan  | July-94      | Maui - Department of Planning                    |
| 37 | State Airports, Harbors and Highways   | January-01   | State - Office of Planning                       |
| 38 | Department of Water Supply: Water Quality Report for 2000                                    | July-01      | Maui - Department of Water Supply                |
| 39 | The County of Hawaii Annual Report 1999-2000   | June-00      | Hawaii - Department of Planning                  |
| 40 | Department of Water Supply - County of Maui: Annual Report. Fiscal Year Ending June 30,2000. | June-00      | Department of Water Supply                       |
| 42 | Statewide Framework for Updating the Hawaii Water Plan                                       | February-00  | Commission on Water Resource Management          |
| 43 | Water Resource Planning  | February-00  | Commission on Water Resource Management          |
| 44 | Water Resources on Oahu  | January-01   | Honolulu - Department of Planning and Permitting |
| 45 | Welcome to the Garden Island of Kauai - Access to Kauai County Agencies                      | January-00   | Kauai - Department of Planning                   |
| 46 | Report to the Governor on the Effectiveness of the Capacity Development Strategy             | July-01      | Hawaii - Department of Planning                  |
| 47 | Water Plan 2020 - Department of Water: County of Kauai                                       | March-01     | Kauai - Department of Water Supply               |
| 48 | Safe Drinking Water Query Results  | April-02     | Honolulu - Department of Planning and Permitting |
| 49 | Maui County: State of Hawaii   | January-00   | Maui - Department of Planning                    |
| 50 | County of Maui: Fiscal Year 2002 Budget  | March-01     | Maui - Department of Planning                    |
| 51 | County of Hawaii: 1999 - 2000 Annual Report  | September-00 | County of Hawaii                                 |

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| 52 | DEPARTMENT OF PARKS AND RECREATION   | November-01  | Honolulu - Department of Planning and Permitting                 |
| 53 | Honolulu Police Department 2000 Annual Report  | September-00 | Honolulu - Department of Planning and Permitting                 |
| 54 | Fiscal Year 2002 Operating Budget-Maui County  | July-01      | Maui - Department of Water Supply                                |
| 55 | Survey of Cruiseship Passengers in Hawaii-Fall 2000  | March-01     | State - Office of Planning                                       |
| 56 | The Integrated Solid Waste Management Plan   | January-91   | State - Office of Planning                                       |
| 57 | Hawaiian Streams: The Mauka to Makai Connection  | April-02     | State - Office of Planning                                       |
| 58 | REPORT TO THE TWENTY-FIRST LEGISLATURE REGULAR SESSION OF 2002 ON PROGRESS REPORT ON EXPENDITURES AND EFFECTIVENESS OF INVASIVE SPECIES PROGRAMS FOR THE PERIOD JULY 1, 2001 TO OCTOBER 31, 2001 | November-01  | State - Office of Planning                                       |
| 59 | PORT Hawaii Commercial Harbors System HANDBOOK   | January-93   | State - Office of Planning                                       |
| 61 | Annual Report to the Twenty-First Legislature-Regular Session 2002/Hawaii Coastal Zone Management  | December-01  | State - Office of Planning                                       |
| 62 | Hawaii Tourism Authority: 2001 Annual Report to the Hawaii State Legislature   | December-01  | State - Hawaii Tourism Authority                                 |
| 63 | Joint State/County Maui Interim Transportation Plan  | January-02   | Maui - Department of Public Works                                |
| 64 | The State of Hawaii Data Book 2000: A Statistical Abstract   | 2001         | State - Department of Business, Economic Development and Tourism |
| 65 | Long-Range Financial Plan and Solid Waste User Free Study  | April-99     | Honolulu - Department of Environmental Services                  |
| 66 | Koolaupoko: Sustainable Communities Plan   | August-00    | Honolulu - Department of Planning and Permitting                 |
| 67 | Annual Summary Hawaii Air Quality Data: 2000   | January-00   | State - Department of Health                                     |
| 68 | Report to Legislature, Progress on the Study, Planning for Sustainable Tourism in Hawaii, January 2002   | January-02   | State - Department of Business, Economic Development and Tourism |
| 69 | DUPLICATE Draft Hawaii Statewide Transportation Plan   | March-02     | State - Office of Planning                                       |

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| 70 | Statewide Transportation Improvement Program: Fiscal Years 2002, 2003, and 2004  | October-01  | State - Office of Planning                                       |
| 71 | Alternative Funding Mechanisms for Environmental Programs  | January-02  | State - Office of Planning                                       |
| 72 | Hawaii Trail Analysis: Survey & Risk Management Data Profile   | March-01    | State - Department of Land and Natural Resources                 |
| 74 | Environmental Report Card 2001   | January-01  | State - Environmental Council                                    |
| 75 | Identification of Rivers and Streams Worthy of Protection  | November-01 | State - Department of Land and Natural Resources                 |
| 76 | Potential Sources of Permanent Funding; REPORT TO THE TWENTY-FIRST LEGISLATURE REGULAR SESSION OF 2002 ON PROGRESS REPORT ON EXPENDITURES AND EFFECTIVENESS OF INVASIVE SPECIES PROGRAMS FOR THE PERIOD JULY 1, 2001 TO OCTOBER 31, 2001 | January-02  | State - Office of Planning                                       |
| 77 | State Energy Resources Coordinator: Annual Report 2001   | January-01  | State - Department of Business, Economic Development and Tourism |
| 78 | 2000 State of Hawaii: Facts and Figures  | January-01  | State - Department of Business, Economic Development and Tourism |
| 79 | 150 Years of Aloha: Hawaii State Department of Health 2001 Annual Report   | January-01  | State - Department of Health                                     |
| 80 | 2001 Visitor Plant Inventory   | April-02    | State - Department of Business, Economic Development and Tourism |
| 81 | Task Force to Create a Master Plan for Water Quality and Flood Mitigation for Waimanalo  | December-01 | State - Department of Land and Natural Resources                 |
| 82 | What Could Hawaii Do With Teaming With Wildlife (TWW) Dollars?   | January-00  | Hawaii - Department of Planning                                  |
| 83 | Relating to Watershed Protection   | October-01  | State - Department of Land and Natural Resources                 |
| 84 | Population and Economic Projections for the State of Hawaii to 2025  | February-00 | State - Department of Business, Economic Development and Tourism |
| 85 | Progress Report on Expenditures and Effectiveness of Invasive Species Programs   | November-01 | State - Department of Land and Natural Resources                 |

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| 86  | Report to the Twenty-First Legislature Relating to Integrated Solid Waste Management   | September-01 | State - Department of Health                            |
| 87  | Annual Report to the Twenty-First Legislature Regular Session of 2002 Relating to the Forest Stewardship Program                                 | November-01  | State - Department of Land and Natural Resources        |
| 88  | Analysis of Once-Per-Week Refuse Collection  | April-99     | Honolulu - Department of Environmental Services         |
| 89  | An Inventory of Non-Native Timber Resources on Hawaii - A Supplement to the 1999 Waiakea and Hamakua Timber Inventory                            | January-01   | State - DLNR Division of Forestry and Wildlife          |
| 90  | Annual Report: Fiscal Year 1999-2000 - Public Utilities Commission   | December-00  | State - Public Utilities Commission                     |
| 91  | Hawaii Tourism Product Assessment  | June-99      | State - Hawaii Tourism Authority                        |
| 92  | Central Oahu Sustainable Communities Plan  | February-02  | Honolulu - Department of Planning and Permitting        |
| 93  | East Honolulu Sustainable Communities Plan   | April-01     | Honolulu - Department of Planning and Permitting        |
| 94  | Ewa Development Plan   | August-97    | Honolulu - Department of Planning and Permitting        |
| 95  | Koolau Loa Sustainable Communities Plan  | October-99   | Honolulu - Department of Planning and Permitting        |
| 96  | North Shore Sustainable Communities Plan   | July-00      | Honolulu - Department of Planning and Permitting        |
| 97  | Waianae Sustainable Communities Plan   | July-00      | Honolulu - Department of Planning and Permitting        |
| 99  | Annual Report to the Twenty-First Legislature 2001 Regular Session on Act 152 SLH 2001 (HB 2835, HD2, SD2, CD1) RELATING TO WATERSHED PROTECTION | October-02   | State - DLNR Division of Forestry and Wildlife          |
| 100 | Upcountry Town Center, Pukulani, Maui, Hawaii, Draft Environmental Impact Statement  | April-02     | Maui - Department of Planning                           |
| 101 | DRAFT Hawaii Statewide Transportation Plan, State of Hawaii Department of Transportation   | March-02     | State - Department of Transportation - Highway Division |
| 102 | Department of Transportation Annual Report 2000  | January-00   | State - Department of Transportation                    |
| 103 | Hawaii Coastal Erosion Management Plan (COEMAP)  | January-00   | State - Department of Land and Natural Resources        |

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| 104 | DRAFT Kailua Bay Advisory Council Master Plan   | March-02    | Kailua Bay Advisory Council                                      |
| 105 | Final Technical Program Report  | March-01    | Kailua Bay Advisory Council                                      |
| 107 | 2000 Annual Visitors Research Report  | 2000        | State - Department of Business, Economic Development and Tourism |
| 108 | ANNUAL REPORT TO THE TWENTY-FIRST LEGISLATURE REGULAR SESSION OF 2002 ON THE STATUS OF THE ISSUANCE OF INCIDENTAL TAKE LICENSES FOR ENDANGERED, THREATENED, PROPOSED, AND CANDIDATE SPECIES; AND THE CONDITION OF THE ENDANGERED SPECIES TRUST FUND | November-01 | State- DLNR Division of Forestry and Wildlife                    |
| 111 | DUPLICATE Annual Summary Hawaii Air Quality Data  | January-00  | State - Department of Health (DOH)                               |
| 112 | Forest Inventory Information Needs Assessment for the State of Hawaii with Emphasis on the Island of Maui   | April-00    | USDA Forest Service  |
| 113 | Observation of Asian Pollution Over Hawaii  | March-01    | Hawaii Institute of Geophysics and Planetology                   |
| 114 | Indicators of Environmental Quality   | January-02  | State - Department of Health (DOH)                               |
| 115 | Reply to ASK-AN-EARTH-SCIENTIST   | January-01  | Hawaii Institute of Geophysics and Planetology                   |
| 117 | Breathing Protection During Volcanic Air Pollution  | January-02  | American Lung Association  |
| 118 | Maui Clean Air Coalition  | December-98 | Maui Clean Air Coalition   |
| 119 | DUPLICATE WORLD HEALTH ORGANIZATION CITIES AND A HEALTH RESEARCH PROGRAM  | March-00    | City and County of Honolulu                                      |
| 120 | What is baseline Air Quality?   | January-00  | Climate Monitoring and Diagnostics Laboratory                    |
| 121 | THE STATE OF THE AIR 2001 IN HAWAII   | January-02  | American Lung Association  |
| 122 | Environmental Health - Clean Air Branch   | January-02  | State - Department of Health                                     |
| 123 | Watershed Protection and Management Program   | October-01  | State - DLNR Division of Forestry and Wildlife                   |
| 124 | USGS Geological Survey Programs in Hawaii & the Pacific   | November-96 | U.S. Geological Survey   |
| 125 | Rx for Hawaii's Dry Forests: It's Not Limiting Grazing  | June-00     | Society of American Foresters                                    |

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| 126 | The Lowland Mesic Forests  | March-02     | State - DLNR Division of Forestry and Wildlife                   |
| 127 | Final Statewide Airport System Plan  | June-98      | State - Department of Transportation                             |
| 128 | Hawaii Sea Grant College Program   | May-02       | County of Hawaii   |
| 129 | Division of Boating and Ocean Recreation - DBEDT Sustainable Tourism Analysis              | May-02       | State - Department of Land and Natural Resources                 |
| 130 | Honolulu Fire Department Response to the DBEDT Sustainable Tourism Analysis                | May-02       | Honolulu - Fire Department                                       |
| 131 | State Parks of the Islands   | January-02   | State - Department of Land and Natural Resources                 |
| 132 | Maui Invasive Species Committee (MISC) Pulling Together Initiative - 2002 Project Proposal | October-02   | US Fish and Wildlife - Ecological Division                       |
| 134 | Impact on Alien Plants on Hawaii's Native Biota  | May-98       | University of Hawaii   |
| 135 | Annual Report - Department of Public Works & Waste Management - 2000-2001                  | January-02   | Maui - Department of Public Works                                |
| 136 | National Park Service Statistical Abstract 2001  | January-02   | National Park Service  |
| 137 | Analysis of Renewable Portfolio Standard Options for Hawaii.                               | March-01     | State - Department of Business, Economic Development and Tourism |
| 139 | The Eight Main Hawaiian Island and CRAMP study sites                                       | September-00 | Hawaii Institute of Marine Biology                               |
| 140 | Molokai Community Plan 2001  | December-01  | Maui - Department of Planning                                    |
| 141 | Fiscal Year 2001 Budget  | May-02       | Maui - Department of Public Works                                |
| 142 | County of Hawaii Data Book - 2001  | October-01   | County of Hawaii   |
| 144 | Big Island of Hawaii Flora and Fauna   | January-01   | Hawaii State Vacation Planner                                    |
| 145 | Mauna Kea Silversword  | January-02   | National Wildlife Federation                                     |
| 146 | Hawaii's Endangered Species  | January-02   | Maui - Department of Public Works                                |
| 147 | FY 2003 Budget   | March-02     | Maui - Department of Planning                                    |

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| 148 | The Hawaiian Endangered Bird Conservation Program The Hawaiian Endangered Bird Conservation The Hawaiian Endangered Bird Conservation Program Five-Year Program (2001-2005) Five-Year Workplan (2001 – 2005) | October-01   | State - Department of Land and Natural Resources |
| 149 | Places We Protect - Watershed Partnerships and Preserves   | January-02   | The Nature Conservancy                           |
| 150 | The Dirty Dozen: America's Least Wanted  | January-01   | Nature Serve                                     |
| 151 | The Hawaiian Ecoregion: A Crucible of Evolution  | September-96 | Sierra Club, Hawaii Chapter                      |
| 152 | Hawaii's Endangered Species  | March-00     | Bishop Museum                                    |
| 153 | Water for Life: The History and Future of Water on Oahu.   | January-02   | Honolulu - Board of Water Supply                 |
| 154 | Report to the World Health Organization  | March-00     | City and County of Honolulu                      |
| 155 | Vision Projects FY2002   | March-02     | City and County of Honolulu                      |
| 156 | H3: The Island Interstate  | August-93    | U.S. Department of Transportation                |
| 157 | Appendix for Hawaii  | January-01   | Surfrider Foundation                             |
| 158 | Oahu Water Recycling May Expand  | August-01    | Honolulu Star Bulletin                           |
| 159 | Recycling Water is Smart Thinking  | August-01    | Honolulu Star Bulletin                           |
| 160 | About Honolulu's Clean Water Program   | January-02   | City and County of Honolulu                      |
| 161 | Mayor Jeremy Harris' State of the City Address   | January-02   | Honolulu Advertiser                              |
| 162 | Recreation   | January-01   | Hawaii State Vacation Planner                    |
| 163 | Oahu in Focus  | January-02   | Destinations2go.com                              |
| 164 | Department Organization: Emergency Medical Services Division   | February-97  | Oahu - Department of Emergency Services          |
| 165 | Finance Division   | January-02   | Honolulu - Police Department                     |
| 166 | STATE OF THE STATE ADDRESS<br>BY GOVERNOR BENJAMIN J. CAYETANO<br>BEFORE THE JOINT SESSION OF THE<br>TWENTY-FIRST HAWAII STATE LEGISLATURE   | January-02   | State - Office of the Governor                   |
| 167 | STATE EMERGENCY MEDICAL SERVICES & INJURY PREVENTION SYSTEM  | October-01   | State - Department of Health (DOH)               |

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| 168 | Chapter Eco-activism   | October-00   | Surfrider Foundation   |
| 169 | [Flood Control and Drainage] Flooding and Other Natural Hazards  | December-01  | County of Hawaii   |
| 170 | Research Projects  | September-01 | State - Department of Health (DOH)                               |
| 171 | Addendum to the Integrated Solid Waste Management Plan for the County of Hawaii  | May-02       | County of Hawaii   |
| 172 | Atlas of Hawaii  | December-98  | Juvik and Juvik  |
| 173 | Place Names of Hawaii  | December-76  | Pukui, Elbert and Mookini  |
| 174 | Hawaiian Word Processing Tools: Hawaiian Language Fonts  | December-95  | Guava Graphics   |
| 175 | Hawaiian Dictionary: Hawaiian-English English-Hawaiian   | December-86  | Pukui and Elbert   |
| 177 | Strategic Plan Update for Hawaii's Environmental Protection Programs   | August-01    | State - Department of Health                                     |
| 178 | Hawaii Marine Life Conservation Districts  | January-01   | State - Department of Land and Natural Resources                 |
| 179 | Hawaii- Department of Aquatic Resources Agency   | January-01   | State - Department of Land and Natural Resources                 |
| 180 | Hawaii Stock Management (USDoC-NOAA)   | January-01   | USDoc-NOAA   |
| 181 | National Marine Fisheries Honolulu Laboratory  | January-01   | National Marine Fisheries Service                                |
| 182 | Hawaiian streams: the Mauka to Makai Connection  | January-01   | State - Department of Land and Natural Resources                 |
| 183 | Alien Species in Hawaiian Streams  | January-01   | State - Department of Land and Natural Resources                 |
| 184 | Hawaii's Native Stream Animals   | January-01   | State - Department of Land and Natural Resources                 |
| 185 | Economic Analysis of Critical Habitat Designations for 76 Plants from the Islands of Kauai and Niihau                          | January-02   | US Fish and Wildlife Service                                     |
| 186 | Wetlands   | January-01   | State - Department of Business, Economic Development and Tourism |
| 187 | Company; Kawai Nui Marsh (' <a href="http://www.aecos.com/KOOLAU/Kawai_Nui_2.html">www.aecos.com/KOOLAU/Kawai_Nui_2.html</a> ) | January-01   | Aecos, Co.   |
| 188 | Hawaiian Islands Initiative  | January-01   | Ducks Unlimited  |
| 189 | Kawa Stream TMDL Project Stream Assessment Report  | January-02   | Aecos, Co.   |
| 190 | Kawa Stream (' <a href="http://www.pixi.com/~isd/KawaStr.html">www.pixi.com/~isd/KawaStr.html</a> )                            | January-01   | Pixi, Co.  |

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| 191 | County of Maui FY 2003 Budget  | December-02 | Maui - Mayor's Office   |
| 193 | Comprehensive Annual Financial Report  | June-01     | County of Hawaii  |
| 194 | Executive Supplemental Budget FY 2003  | January-02  | State of Hawaii - Department of Budget and Finance                                |
| 195 | Coral Reef Assessment and Monitoring Program (CRAMP) - Final Report 1998-99  | January-00  | Hawaii Institute of Marine Biology  |
| 196 | Coral Reef Assessment and Monitoring Program (CRAMP) - Final Report 1999-2000  | January-01  | Hawaii Institute of Marine Biology  |
| 197 | Fire Department  | December-01 | Hawaii - Department of Fire Control   |
| 198 | DUPLICATE Department of Parks and Recreation   | December-01 | Hawaii - Department of Parks and Recreation                                       |
| 199 | Police Department  | December-01 | Hawaii - Police Department  |
| 200 | Department of Public Works   | December-01 | Hawaii - Department of Public Works   |
| 201 | Department of Water Supply   | December-01 | Hawaii - Board of Water Supply  |
| 202 | State of Hawaii 303(d) List of Water Quality Limited Waters - 1998   | December-98 | State - Department of Health  |
| 203 | Learning to Live with the Dynamic Hawaiian Shoreline<br>(' <a href="http://www.soest.hawaii.edu/SEAGRANT/LiveWithTheHawaiianShoreline/index.htm">http://www.soest.hawaii.edu/SEAGRANT/LiveWithTheHawaiianShoreline/index.htm</a> ) | April-02    | SOEST   |
| 204 | Hawaii's Most Invasive Horticultural Plants: An Introduction   | May-01      | State - Department of Land and Natural Resources                                  |
| 205 | Big Island Invasive Species Committee  | February-00 | U.S. Geological Survey  |
| 206 | Kapalua Mauka  | December-01 | Maui - Department of Planning<br>Honolulu - Department of Planning and Permitting |
| 207 | DUPLICATE Waikiki Beach Walk   | January-02  | Honolulu - Department of Planning and Permitting                                  |
| 208 | DUPLICATE Ocean Bay Plantation   | June-02     | Kauai - Department of Planning  |
| 209 | Voyager Submarines Hawaii Artificial Reef Installation   | April-98    | Hawaii - Department of Planning   |
| 210 | Hawaiian Electric Company, Inc. Integrated Resource Plan 1998-2017   | January-98  | Hawaiian Electric Company   |
| 211 | Kauai Electric 1997 Integrated Resource Plan   | April-97    | Kauai Electric  |
| 212 | The State of Hawaii Airport Activity Statistics Calendar Year 2001   | May-01      | State - Department of Transportation  |

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| 213 | Final Supplemental Environmental Impact Statement Mauna Lani Cove Mauna Lani Resort South Kohala, Hawaii                     | October-90  | Hawaii - Department of Planning                                  |
| 214 | Environmental Impact Statement Kohanaiki Mauka Kohaniki, North Kona, Hawaii  | October-91  | Hawaii - Department of Planning                                  |
| 215 | Final Environmental Impact Statement and Site Selection Study for the New Hanalei Middle School                              | May-99      | Hawaii - Department of Accounting and General Services           |
| 216 | Supplemental Environmental Impact Statement Kukuiula Bay Resort Kukuiula Planned Community Koloa, Kauai, Hawaii              | August-98   | Kauai - Department of Planning                                   |
| 217 | Final Impact Statement Kauai Electric Lihue Energy Service Center  | March-99    | Kauai - Department of Planning                                   |
| 218 | Ocean Bay Plantation at Hanamaulu; Hanamaulu, Kauai, Hawaii  | June-02     | Kauai - Department of Planning                                   |
| 219 | Waikiki Development Plan Final Impact Statement  | November-01 | Honolulu - Department of Planning                                |
| 220 | Waikiki Beach Walk Waikiki, Oahu, Hawaii Final Impact Statement  | January-02  | Honolulu - Department of Planning                                |
| 221 | Final Impact Statement Voyager Submarines Hawaii Artificial Reef Installation  | April-98    | State - Department of Land and Natural Resources                 |
| 222 | Final Environmental Impact Statement for the Supplemental Waiialua-Haleiwa Wastewater Facility Plan                          | June-96     | Honolulu - Department of Wastewater Management                   |
| 223 | Final Environmental Impact Statement Lanai Airport Master Plan Improvements; Lanai Airport, Lanai, Hawaii                    | December-90 | State - Department of Transportation                             |
| 224 | County of Maui: Kalamaula Landfill Closure Project; Draft Environmental Impact Statement                                     | February-93 | Maui - Department of Public Works and Waste Management           |
| 225 | Kihei Upcountry Maui Highway; Final Environmental Impact Statement   | February-02 | State - Department of Transportation                             |
| 226 | Kapalua Mauka; Draft Environmental Impact Statement  | December-01 | Maui - Department of Planning                                    |
| 227 | Kona Civic Center Site Selection Study / Final Environmental Impact Statement  | August-94   | Hawaii - Department of Accounting and General Services           |
| 228 | Final Environmental Impact Statement for Kohala Water Transmission System North And South Kohala Districts, Island of Hawaii | November-95 | Hawaii - Board of Water Supply                                   |
| 229 | Hawaii Energy Strategy 2000  | December-00 | State - Department of Business, Economic Development and Tourism |
| 230 | Hanalei Pier Reconstruction Final Environmental Impact Statement   | June-90     | State - Department of Land and Natural Resources                 |
| 231 | Hanalei Excursion Boat Staging Operations; Hanalei, Kauai; Draft Environmental Impact Statement                              | October-90  | Kauai - Department of Planning                                   |
| 232 | Draft Environmental Impact Statement Kapalawai, Kauai, Hawaii; Kapalawai Resort  | October-99  | Kauai - Department of Planning                                   |

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| 233 | Draft Environmental Impact Statement Kalamaula Residence Lots- Unit 1; Kalamaula, Molokai, Hawaii    | May-95       | State Department of Hawaiian Home Lands                          |
| 234 | Upcountry Town Center, Pukulani, Maui, Hawaii; Draft Environmental Impact Statement                  | April-02     | Maui - Department of Planning                                    |
| 235 | Manele Golf course and Golf Residential Project, Lanai, Hawaii; Final Environmental Impact Statement | October-91   | Maui - Department of Planning                                    |
| 236 | Kaupulehu Resort Final Environmental Impact Statement  | October-94   | Hawaii - Department of Planning                                  |
| 237 | Final Environmental Impact Statement Amanresort Waikoekoe and Kanahonua, Hamakua district, Hawaii    | February-94  | Hawaii - Department of Planning                                  |
| 238 | Maniniowali Residential Community North Kona, Hawaii Final Environmental Impact Statement            | February-92  | Hawaii - Department of Planning                                  |
| 239 | DUPLICATE County of Hawaii Data Book   | October-01   | Hawaii - Department of Research and Development                  |
| 240 | Annual Report Fiscal Year 2000-2001  | August-01    | County of Hawaii   |
| 241 | Primary Urban Center Development Plan  | May-02       | Honolulu - Department of Planning and Permitting                 |
| 242 | The Hawaii State Plan: Recreation  | May-91       | State - Department of Land and Natural Resources                 |
| 243 | Funds Required for Reconstruction of Park Facilities 2002-2012                                       | January-02   | Honolulu - Department of Planning and Permitting                 |
| 244 | World Health Organization Cities and a Health Research Program                                       | May-02       | Honolulu - Emergency Services                                    |
| 245 | Six-Year CIP and Budget FY 2003-2008   | January-02   | Honolulu- Department of Budget and Finance                       |
| 246 | DUPLICATE County of Maui Fiscal Year 2003 Budget   | September-02 | Maui- Mayor's Office   |
| 247 | Maui County Data Book 2001   | June-01      | Maui Office of Economic Development                              |
| 248 | Hawaii's Implementation Plan for Polluted Runoff Control   | July-00      | State - Department of Health                                     |
| 249 | Public Comment Draft 2002 List of Impaired Waters in Hawaii Prepared Under Clean Water Act 303d      | August-02    | State - Department of Health                                     |
| 250 | Maui County Department of Fire Control   | January-01   | Maui - Department of Fire Control                                |
| 251 | Visit Your Parks Park Guide  | October-02   | Honolulu Advertiser  |
| 252 | 2001 The State of Hawaii Data Book   | 2002         | State - Department of Business, Economic Development and Tourism |

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| 253 | Transportation Plan for Oahu TOP 2025  | April-01   | Oahu Metropolitan Planning Organization and its Participating Agencies |
| 254 | Commission on Water Resource Management: Learn about the Water Commission-Frequently Asked Questions | January-11 | State - Commission on Water Resource Management                        |
| 255 | The County of Hawaii Annual Report 1999-2000   | January-01 | Hawaii - Department of Public Works                                    |
| 256 | The County of Hawaii Annual Report 2000-2001   | January-01 | Hawaii - Department of Public Works                                    |
| 257 | Kauai Invasive Species Committee   | January-02 | Kauai Invasive Species Committee                                       |

| ID c | FIRST NAME     | LAST NAME  | DATE      | AGENCY   |
|------|----------------|------------|-----------|--|
| 1    | Deanne         | Obatake    | 4/3/2002  | Hawai'i Natural Heritage Program                       |
| 2    | Ben            | Schlaepck  | 4/22/2002 | State - Office of Planning                             |
| 3    | Fred           | Pascua     | 4/17/2002 | State - Office of Planning                             |
| 4    | Craig          | Tasaka     | 4/25/2002 | State - Office of Planning                             |
| 5    | Glen           | Fukunaga   | 4/25/2002 | State - Department of Health                           |
| 6    | Joan           | Esposito   | 4/25/2002 | State - Office of Planning                             |
| 7    | Iris           | Ishida     | 4/23/2002 | State - Office of Planning                             |
| 8    | Fred           | Pascua     | 4/23/2002 | State - Office of Planning                             |
| 10   | Fred           | Pascua     | 4/17/2002 | State - Office of Planning                             |
| 11   | Ron            | Michols    | 4/13/2002 | State - Office of Planning                             |
| 12   | Karen          | Tanoie     | 4/13/2002 | State - Office of Planning                             |
| 13   | Lisa           | N/A        | 4/13/2002 | Hawaii - Department of Planning                        |
| 14   | Eileen         | n/a        | 4/16/2002 | State - Office of Planning                             |
| 15   | Cathy          | Tam        | 4/16/2002 | State - Office of Planning                             |
| 16   | Chris          | Kam        | 4/17/2002 | State - Office of Planning                             |
| 17   | Stan / Shirley | n/a        | 4/13/2002 | State - Office of Planning                             |
| 18   | Jeff           | Hull       | 4/13/2002 | State - Office of Planning                             |
| 19   | n/a            | n/a        | 4/17/2002 | State - Office of Planning                             |
| 20   | Glenn          | Yasui      | 4/1/2002  | State - Office of Planning                             |
| 22   | Steve          | Kyono      | 4/1/2002  | State - Office of Planning                             |
| 23   | Richard        | Soo        | 5/3/2002  | Oahu -Fire Department                                  |
| 25   | Daniel         | Quinn      | 6/4/2002  | State - Office of Planning                             |
| 26   | Ian            | Birnie     | 5/7/2002  | State - Hawaii Tourism Authority                       |
| 27   | Thomas         | Cunningham | 5/7/2002  | State - Hawaii Tourism Authority                       |
| 28   | Robert         | Crowell    | 5/7/2002  | Kauai - Department of Transportation - Harbor Division |
| 29   | David          | Goode      | 5/7/2002  | Maui - Department of Public Works                      |
| 30   | David          | Craddick   | 5/7/2002  | Oahu - Department of Water Supply                      |
| 31   | William        | Balfour    | 4/30/2002 | Oahu - Department of Parks and Recreation              |
| 32   | Linnel         | Nishioka   | 5/7/2002  | Commission on Water Resource Management                |
| 33   | Clifford       | Jamile     | 5/7/2002  | Oahu - Department of Water Supply                      |
| 34   | Barry          | Kim        | 4/30/2002 | Oahu - Department of Transportation - Harbor Division  |
| 35   | Lee            | Donohue    | 5/7/2002  | Oahu -Police Department                                |
| 36   | Salvatore      | Lanzilotti | 5/7/2002  | Oahu - Department of Emergency Services                |
| 37   | Attilio        | Leonardi   | 5/7/2002  | Oahu - Fire Department                                 |
| 38   | Thomas         | Phillips   | 5/7/2002  | Police Department                                      |
| 39   | Jeffrey        | Bearman    | 5/7/2002  | Hawaii - Small Boat Harbors                            |
| 40   | Vaughan        | Tyndzik    | 5/7/2002  | Kauai - Small Boat Harbors                             |
| 41   | Charles        | Penque     | 5/7/2002  | Maui - Small Boat Harbors                              |
| 42   | Clayton        | Ishikawa   | 5/7/2002  | Maui - Department of Fire Control                      |



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|----|-------------|---------------|-----------|---|
| 43 | Glenn       | Yasui         | 4/30/2002 | State - Department of Transportation - Highway Division |
| 44 | N/A         | N/A           | 4/30/2002 | Hawaii - Board of Water Supply                          |
| 45 | David       | Sproat        | 4/30/2002 | Kauai - Department of Fire Control                      |
| 46 | George      | Fretias       | 4/30/2002 | Kauai - Department of Fire Control                      |
| 47 | Dely        | Sasaki        | 4/30/2002 | State - Department of Health (DOH)                      |
| 48 | Darryl      | Oliveira      | 4/30/2002 | Hawaii - Department of Fire Control                     |
| 50 | Curt        | Murimoto      | 5/7/2002  | Maui - Department of Emergency Service                  |
| 51 | Mason       | Young         | 5/7/2002  | Oahu - Small Boat Harbors                               |
| 52 | Kevin       | N/A           | 5/7/2002  | Hawaii - Board of Water Supply                          |
| 53 | Fred        | Nunes         | 5/7/2002  | Oahu - Department of Transportation - Harbor Division   |
| 54 | n/a         | n/a           | 5/7/2002  | Oahu - Department of Environmental Services             |
| 55 | Tim         | Houghton      | 5/7/2002  | Division of Environmental Quality                       |
| 56 | Kenneth     | Kaneshiro     | 5/7/2002  | Natural Resources Conservation Service                  |
| 57 | Gary        | Barbano       | 5/7/2002  | National Park Service                                   |
| 58 | Rae         | Loui          | 5/7/2002  | Department of Design and Construction                   |
| 59 | n/a         | n/a           | 5/7/2002  | Fish and Wildlife - Ecological Division                 |
| 60 | David       | Helweg        | 5/7/2002  | U.S. Geological Survey                                  |
| 61 | Jill        | N/A           | 5/7/2002  | U.S. Geological Survey                                  |
| 62 | Lorean      | n/a           | 5/7/2002  | U.S. Geological Survey                                  |
| 63 | Charlene    | N/A           | 5/7/2002  | U.S. Geological Survey                                  |
| 64 | Wendy       | n/a           | 5/7/2002  | National Marine Fisheries Service                       |
| 65 | Jim         | Maskrey       | 5/13/2002 | Hawaiian Electric Company                               |
| 66 | Hans        | ?             | 5/10/2002 | National Weather Service                                |
| 68 | Pearlyn     | Fukuba        | 5/8/2002  | State - Department of Land and Natural Resources        |
| 69 | Melia       | Lane-Kamahele | 5/21/2002 | National Park Service                                   |
| 70 | Sandra      | Kirschenbaum  | 5/16/2002 | State - Department of Transportation                    |
| 71 | Jack        | Liu           | 5/20/2002 | Division of Environmental Quality                       |
| 72 | Lowell      | Chun          | 5/14/2002 | Honolulu - Department of Planning and Permitting        |
| 73 | Brian       | Miskae        | 5/14/2002 | Maui - Department of Planning                           |
| 74 | Tim         | Blume         | 5/14/2002 | Kauai Electric  |
| 75 | Joyce       | Mitsunaga     | 6/4/2002  | Department of Parks and Recreation                      |
| 76 | Nancy       | Murphy        | 5/21/2002 | Hawaii - Small Boat Harbors                             |
| 77 | Michael     | Buck          | 5/22/2002 | State - DLNR Division of Forestry and Wildlife          |
| 78 | Glenn       | Taguchi       | 6/4/2002  | State - DLNR Division of State Parks                    |
| 79 | Gareth      | Sakakida      | 5/10/2002 | Hawaii Transportation Association                       |
| 80 | Steven      | Levins        | 5/10/2002 | Department of Taxation                                  |
| 81 | Linda       | Cantorna      | 5/21/2002 | Department of Taxation                                  |
| 82 | Carol       | Shay          | 5/21/2002 | Maui - Small Boat Harbors                               |
| 83 | Phillip     | Ohta          | 6/5/2002  | State - DLNR Division of State Parks                    |
| 84 | Paul Scotty | Paiva         | 5/2/2002  | Fire Department   |

|     |         |            |           |  |
|-----|---------|------------|-----------|--|
| 85  | Jerry   | Matsuda    | 5/7/2002  | Department of Transportation - Airport Division                  |
| 86  | Bob     | Hobdy      | 6/5/2002  | State - DLNR Division of Forestry and Wildlife                   |
| 87  | George  | Kuo        | 4/30/2002 | Hawaii - Board of Water Supply                                   |
| 88  | Jon     | Griffin    | 6/5/2002  | State - DLNR Division of Forestry and Wildlife                   |
| 90  | John    | Rooney     | 6/10/2002 | Coastal Geology Group  |
| 91  | James   | Correa     | 4/30/2002 | Police Department  |
| 92  | Lenay   | Lijima     | 6/26/2002 | Department of Health   |
| 93  | Glenn   | Soma       | 7/2/2002  | Oahu - Department of Transportation - Harbor Division            |
| 94  | Brian   | Minaai     | 5/30/2002 | State - Department of Transportation                             |
| 95  | Neil    | Reimer     | 7/5/2002  | State of Hawaii - Department of Agriculture                      |
| 96  | Greer   | Prince     | 7/22/2002 | Maui - Police Department   |
| 97  | Glenn   | Miyao      | 7/9/2002  | Hawaii - Department of Parks and Recreation                      |
| 99  | Bill    | Medeiros   | 6/30/2002 | Maui - Department of Planning                                    |
| 100 | Gary    | Hashiro    | 8/20/2002 | Hawaiian Electric, Inc.  |
| 101 | Steve   | Alber      | 8/20/2002 | State - Department of Business, Economic Development and Tourism |
| 102 | Peter   | Boucher    | 8/1/2002  | Hawaii - Department of Public Works                              |
| 103 | Greer   | Prince     | 7/23/2002 | Maui Police  |
| 104 | Shannon | MacElvaney | 7/1/2002  | Hawaii Natural Heritage  |